DEVELOPMENT OF AN INTEGRATED DISASTER RISK MANAGEMENT MODEL FOR THE MUNICIPALITIES IN THE FREE STATE PROVINCE

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Thesis in fulfilment of the requirements for the degree:

DOCTORATE OF PUBLIC MANAGEMENT
In the Department of Public Management
FACULTY OF MANAGEMENT SCIENCES
at the
CENTRAL UNIVERSITY OF TECHNOLOGY, FREE STATE

Supervisor: Prof T van Niekerk (DTech. Public Management), April 2018.

DECLARATION OF INDEPENDENT WORK

DECLARATION WITH REGARD TO INDEPENDENT WORK

I, Mr L. Munsamy, Identity Number and student number ,
do hereby declare that this research project submitted to the Central University of Technology, Free State for the Degree DOCTORAL OF PUBLIC MANAGEMENT, is my own independent work; complies with the Code of Academic Integrity, as well as other relevant policies, procedures, rules and regulations of the Central University of Technology, Free State; and has not been submitted before to any institution by myself or any other person in fulfilment (or partial fulfilment) of the requirements for the attainment of any qualification.

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ABSTRACT

Although South Africa's Disaster Risk Management legislation is internationally recognised, its implementation strategies are ineffective, which exposes vulnerable communities to the ravages of weather-related disasters. Climate change also contributes to weather-related disasters such as floods, droughts and fires, posing a serious threat to sustainable development and poverty alleviation in South Africa. A growing body of literature recognises the origins of the disasters, preparedness programmes and the disaster management cycle, yet there is a paucity of research on developing a model for municipalities to understand the basic tenets of Disaster Risk Management. The aim of the study is to contribute positively to the improvement of Disaster Risk Management by developing an integrated Disaster Risk Management model that would assist municipalities in the Free State Province to plan, implement and manage disasters risks effectively. The proposed integrated Disaster Risk Management model is based on the Cuny Comprehensive and Manitoba models and which comprises three critical elements: Hazard Analysis, Risk Management and Operations Management. The empirical study used a mixed method approach with a pragmatic paradigm. Data sets were processed using the Statistical Package for Social Sciences (SPSS 24), achieving a coefficient correlation of 0.74 using the Cronbach's alpha as a test measure. The study found that 41% of the respondents are qualified up to Level 6 or higher on the National Qualification Framework, 79% were employed at operational level, and 48% were employed at strategic level with 6-10 years' experience in Disaster Risk Management. Another finding is that in the Free State Province, compliance with Disaster Risk Management, the DMA (2002) and the NDMF (2005), ranges between 35% and 57%. The results of the qualitative data show that the majority of the respondents agree that an integrated Disaster Risk Management model is necessary for a uniform approach to Disaster Risk Management in the Free State Province. The study concluded that it is necessary for the development and implementation of an integrated disaster risk-management model to render effective disaster-risk management services in the Free State Province.

ACKNOWLEDGEMENTS

My sincere appreciation and gratitude for assistance, motivation and support in the development and successful completion of this study is as follows:

- Firstly, God Almighty, for guiding Professor Tryna van Niekerk to be my mentor, supervisor and for unstinting support throughout my studies. Her meticulous supervisory skills and expertise will always be treasured.
- Secondly, this study is dedicated to my late mum for being a constant pillar of support during dark and difficult times, throughout my study life.
- Thirdly, my wife Jeeva and my three children for their unconditional support throughout my journey in life, to achieve this qualification.
- Lastly and significantly to my friends and colleagues for their constant encouragement and motivation, to shoulder on with my studies.

Thank you to everyone for your support and God be with you always.

Aluta Continua!

LIST OF ACRONYMS AND ABBREVIATIONS

COGTA	**Department of Cooperative Governance and Traditional Affairs**
DAFF	Department of Agriculture, Forestry and Fisheries
DBSA	Development Bank of South Africa
DMA	Disaster Management Act, 2002
DMAF	Disaster Management Advisory Forum
DMC	Disaster Management Centre
DRM	Disaster Risk Management
DRMP	Disaster Risk Management Plan
DRR	Disaster Risk Reduction
DTT	Drought Task Team
EMS	Emergency Management Services
EWS	Early Warning System
FBB	Fire Brigade Board
FPAs	Fire Protection Associations
GIS	Geographic Information System
GPS	Global Positioning System
ICDM	Intergovernmental Committee on Disaster Management
MICDM	Municipal Intergovernmental Committee on Disaster Management
ICT	Information and Communications Technology
IFRC	International Federation for Red Cross
IDP	Integrated Development Plan
IMC	Inter-ministerial Committee
ISDR	International Strategy for Disaster Reduction
IT	Information Technology
JOC	Joint Operational Centre
KPA	Key Performance Area
MEC	Member of the Executive Committee
MOU	Memorandum of Understanding
NDMAF	National Disaster Management Advisory Forum
NDMC	National Disaster Management Centre
NDMF	National Disaster Management Framework
NGOs	Non-governmental Organisations
PDMAF	Provincial Disaster Management Advisory Forum
PDMC	Provincial Disaster Management Centre

PROVJOC	Provincial Joint Operation Centre
SANDF	South African National Defence Force
SANS	South African National Standards
SAPS	South African Police Service
SARCS	South African Red Cross Society
SAWS	South African Weather Service
SLA	Service Level Agreement
SOPs	Standard Operation Procedures
TTT	Technical Task Team
UNISDR	United Nations International Strategy for Disaster Reduction
UNHCR	United Nations High Commissioner of Refugees
USAR	Urban Search and Rescue
WoF	Working on Fire

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CHAPTER ONE: INTRODUCTION TO THE STUDY

1.1 INTRODUCTION AND BACKGROUND

During the first decade of the 21st century, numerous incidents of earthquakes, landslides, thunderstorms, hurricanes, infernos, tornadoes, floods, wildfires, tsunamis, volcanic eruptions, dam collapses, chemical spillages, explosions, severe droughts, violent uprisings and massacres have been reported around the world with varying degrees of destruction. These incidents pose serious threats to developing countries such as in Sub-Saharan Africa that are more vulnerable to the impact of large-scale disasters. Developing countries such as South Africa need to be proactive in terms of reducing disaster risks (Oluwu, 2010:303-304; Schipper and Pelling, 2006:19-38).

The absence of appropriate legislative and policy frameworks, as well as insufficient and inadequate resources further exposes the vulnerability of countries to disasters (African Union, 2004:2). The Report on Disaster Risk Reduction of the African Union (2006:2) further states that a variety of disasters occurs in Sub-Saharan Africa every year. The inability of these African countries to manage and reduce disasters effectively is because of inappropriate planning and inadequate funding. In addition, reliance on out-dated or dysfunctional systems of disaster management, lack of proficiency and the inability to access technological data further contribute to these disasters.

The result is that, increasingly more people are adversely affected by various types of disasters. The severity and impact of floods, fires, droughts and other disasters differ from one country to another. Climate change, which is the main cause of unpredictable weather patterns across the world, contributes to unexpected disasters such as floods, drought and tsunamis (Oluwu, 2010:303-304).

Disasters pose a serious threat to sustainable development and poverty alleviation all over the world. Schipper and Pelling (2006:19) contend that disasters, development and poverty are closely linked. Infrastructure that is damaged because of disasters impedes developmental gains and aggravate poverty levels, especially in developing countries, where skilled human and financial resources are limited. Therefore,

developing countries such as South Africa need to be proactive in terms of reducing disaster risks. In addition, unpredictable weather patterns resulting in many unforeseen flood disasters affect South Africa's economy, which is largely reliant on agriculture. It has also been noted, that these unprecedented flood disasters have a direct impact on sustaining the developmental goals achieved in South Africa thus far (Schipper and Pelling, 2006:19).

Although the focus of this study was confined to the municipalities of the Free State Province, interviews were conducted in the City of Cape Town Metropolitan Municipality in the Western Cape, as well as the Ekurhuleni Metropolitan Municipality in the Gauteng Province. The governance of disaster risk management of these two metropolitan municipalities were compared to that of the Mangaung Metropolitan Municipality in the Free State Province. The study culminated in the development of an integrated disaster-risk management model for the municipalities in the Free State.

1.2 LITERATURE REVIEW

1.2.1 Legislative framework of Disaster Risk Management in South Africa

The *South African Disaster Management Act (57 of 2002)* hereinafter referred to as DMA (2002) was introduced to ensure that Disaster Risk Management is on par with international standards. This was also to ensure that the three spheres of government move away from the previously reactive, response and recovery approach to a more proactive, preventative and preparedness stance regarding Disaster Risk Management. If the municipalities prepared their plans according to the DMA (2002), they would be well prepared for an integrated and coordinated Disaster Risk Management service. If effective mitigating measures, emergency response, recovery and rehabilitation systems were in place, disaster risks would be reduced to a minimum.

The DMA (2002) makes provision for the establishment of a Disaster Risk Management advisory forum at all spheres of government in all provinces of South Africa. The disaster management advisory forums are bodies that incorporate the relevant disaster management role-players within the three spheres of government. The main responsibility of the stakeholders within these forums is to consult one

another and coordinate their actions on matters pertaining to Disaster Risk Management within their jurisdiction.

The DMA (2002) also makes provision for the establishment of National and Provincial Disaster Management Centres. The purpose of these centres is to promote an integrated and coordinated system of Disaster Risk Management, with specific emphasis on the prevention and mitigation of Disaster Risk Management in South Africa. According to the South African DMA (2002), the Municipal Disaster Risk Management Centre must act as a repository of information concerning disasters, impending disasters and Disaster Risk Management. In addition, a Municipal Disaster Risk Management Centre should act as an advisory and consultative body on issues concerning disasters and Disaster Risk Management to schools, vulnerable communities and other stakeholders. This could be done by disseminating information regarding disasters risk management, capacity building, education and training. These Disaster Risk Management Centres must also monitor the prevention, mitigation and response initiatives by all organs of state, the private sector and non-governmental organisations in the municipal area. Consequently, these initiatives must be included in the Integrated Development Plans (IDP) of the municipalities (DMA, 2002). Chapter 5 of the *Local Government Municipal Systems Act (32 of 2000)* makes provision for municipalities to develop a master plan which is referred to the as the IDP. Furthermore, the *Municipal Systems Act* Chapter 5: Part 2 section 26(g) states that municipalities must include in its IDP's, disaster management plans for its jurisdiction.

The DMA (2002) further states that each municipality (metropolitan, district and local municipality) must develop a Disaster Risk Management (DRM) plan, which must include:

- The various types of disaster risks that are likely to occur in that municipal area and the possible impacts thereof, on communities and infrastructure;
- Relevant stakeholders within the municipality, including the various public and private sector organisations;
- The areas, communities and households at risk with emphasis on mitigating measures to reduce vulnerability;

- Weaknesses in human resource capacity to deal with possible disaster risks and provide for appropriate prevention and mitigation strategies;
- Indigenous knowledge relating to Disaster Risk Management;
- Disaster Risk Management research;
- Systems of incentives to promote efficient and effective Disaster Risk Management in the municipalities; and
- Maximum emergency response, recovery and rehabilitation procedures in the event of a disaster DMA (2002).

In fulfilling the above listed obligations, a copy of the Disaster Risk Management plan must be submitted to the provincial and national Disaster Risk Management Centres. On receipt of the risk management plans, Disaster Risk Management Centres may then make recommendations regarding the funding thereof, in line with all relevant municipal legislation.

The National Disaster Management Framework, 2005 (NDMF) is the legal instrument which is designed to assist multiple interest groups to implement the Disaster Management Act (2002) and the NDMF (2005), consistently. In addition, the NDMF (2005) was developed as guidelines that South African municipalities may use in developing coherent, transparent and inclusive DRM policies and plans. Furthermore, this framework, which serves as a guiding tool for effective Disaster Risk Management services focuses on the following four key performance areas:

- The first key performance area focuses on the establishment of integrated institutional capacity within the national sphere of government to enable the effective implementation of Disaster Risk Management policies and legislation (NDMF, 2005).
- The second key performance area is to establish a uniform approach to assess and monitor disaster risks in South Africa. The purpose of this key performance area is to guide the three spheres of government and other role-players to develop and implement their own Disaster Risk Management and risk reduction strategies. (NDMF, 2005).
- The third key performance area strives to ensure that all relevant role-players develop and implement integrated Disaster Risk Management plans, according

to approved legislation. It sets out the requirements for the alignment of Disaster Risk Management frameworks and plans amongst the three spheres of government (NDMF, 2005).

- Lastly, key performance area four makes provision for the implementation of an effective, integrated and coordinated rapid response, recovery and rehabilitation plans within all spheres of the government NDMF (2005). It also describes measures to ensure effective disaster response, recovery and rehabilitation planning are implemented across the three spheres of government (NDMF, 2005).

1.2.2 Disaster Risk Management

A good starting point for the purpose of this study was to establish a common understanding of the tenets of disaster management. Recently, in the international arena, the term 'Disaster Risk Management' is widely preferred, compared to 'disaster management' as a concept.

According to Vermaak and Van Niekerk (2004:555), the increasing number of disasters necessitates an approach that moves beyond pure 'disaster management' that would include Disaster Risk Management and disaster risk reduction. These approaches would include the assessment of risk, before developing mitigation and prevention strategies (Vermaak and Van Niekerk, 2004:555).

According to Coburn, Spence and Promonis (in Van der Waldt *et al.,* 2007:257), Disaster Risk Management refers to all aspects of planning, and responding to disaster activities pre and post the actual disaster. Van Niekerk (in Van der Waldt *et al*., 2007:257) further affirms that the South African definition, as cited in the South African DMA (2002,) focuses on the multisectoral and multidisciplinary approach. Vermaak and Van Niekerk (2004:556-574) further argue that disaster risk reduction is an underlying tenet of Disaster Risk Management in its definition, as provided for by the DMA (2002). Consequently, it could be argued, that the definition emphasises the implementation of measures to reduce risks, which indicates that it encompasses Disaster Risk Management. For this reason, the NDMF (2005) supports the use of the term Disaster Risk Management (DMA, 2002; NDMF, 2005).

According to the United Nations International Strategy for Disaster Reduction (ISDR) (2009:10), Disaster Risk Management refers to the structural and non-structural measures undertaken to prepare for, to mitigate against and or prevent the negative influences of disasters. Gratwa and Bollin (in Van der Waldt *et al.,* 2007:256) argue that Disaster Risk Management refers to all the programmes, projects, measures and instruments aimed at reducing disaster risk in endangered areas, and mitigating the extent of disasters. Thus, Disaster Risk Management includes risk assessment, disaster prevention, mitigation and disaster preparedness.

The DMA (2002) refers to Disaster Risk Management as a continuous, integrated, multisectoral, multidisciplinary process of planning and implementation of measures to:

- Prevent or reduce the risk of disasters;
- Mitigate the severity or impact of disasters;
- Plan for emergency preparedness; rapid and effective response to disasters and;
- Make provision for post-disaster recovery and rehabilitation measures.

In addition, the NDMF (2005:228) makes use of the term Disaster Risk Management, which is an all-encompassing definition referred to in the DMA (2002). For the purpose of this study, the term and definition of Disaster Risk Management as defined in the NDMF (2005) is consistent with the use of the definition in the context of the international arena.

1.2.3 Disaster Risk Reduction

According to Vermaak and Van Niekerk (2004:556), disaster risk reduction reflects a new global approach to the management of disasters. The United Nations International Strategy for Disaster Reduction (ISDR) (2002:25) refers to disaster risk reduction as the “systematic development and application of strategies, legislation, policies and practices in order to minimise vulnerabilities and disaster risks throughout a specific society”. The purpose of disaster risk reduction is to avoid (prevent) or to limit (mitigate and prepare) the adverse effects of hazards within the broader context of sustainable development (ISDR, 2002:25).

On the other hand, the World Bank (2004:4) defines disaster risk reduction as the process of avoiding hazards and reducing vulnerability. The NDMF (2005:3) asserts that disaster risk reduction entails all the elements of Disaster Risk Management. These elements include disaster risk-reduction principles of prevention, mitigation and preparedness strategies that are required to minimise vulnerabilities throughout society (World Bank, 2004:4).

Vermaak and Van Niekerk (2004:556) assert that disaster risk reduction requires the development and application of specific technical skills and abilities to minimise vulnerabilities and disaster risks within a specific region or community. Vermaak and Van Niekerk (2004:558) further argue that disaster risk reduction has a clear focus on the characteristics and impact of hazards and vulnerability with regard to social, political, economic and environmental factors.

Therefore, it may be concluded, that disaster risk reduction encompasses risk and vulnerability assessment of critical social and economic infrastructure, including early warning systems. Moreover, disaster risk reduction requires a multidisciplinary approach for effectiveness. Therefore, all spheres of government have a specific responsibility to develop and apply policies, strategies and practices in such a manner that they minimise disaster risks.

1.2.4 Disaster Risk Assessment

According to the NDMF (2005:235), South Africa continually faces many different types of risks associated with health, environment, finance and security. According to this framework, disaster risk refers to the likelihood of harm or loss due to natural and anthropological disasters, including external threats to vulnerable structures, communities and households (NDMF, 2005:235).

In supporting this view, The United Nations International Strategy for Disaster Reduction (UNISDR) (2002:25-27) defines disaster risk assessment, as the process used to determine the nature and extent of risk, by analysing the potential hazards. This is done by hazard identification, vulnerability analysis, capacity analysis, risk evaluation and risk analysis.

The NDMF (2005:235) affirms that disaster risk assessment is the first step in planning for an effective disaster risk-reduction programme. This includes examining the likelihood and the expected outcomes of disaster risks. For this reason, disaster risk assessment should include an investigation of hazards and conditions of vulnerability that may increase the likelihood of loss.

According to the NDMF (2005:51-68), disaster risk assessment requires an effective monitoring and evaluation system to promote the following:

- Effective Disaster Risk Management and risk-reduction planning;
- Sustainable development planning;
- Identifying potential threats;
- Identify disaster risk-reduction programmes for specific threats;
- Identifying high-risk periods and conditions; and
- To activate preparedness and response actions.

According to The NDMF (2005:45-52), all relevant organs of state, the three spheres of government and the private sector must conduct disaster risk assessment. In doing so, they must identify and prioritise disaster risks relevant to their functional areas:

- Prior to the implementation of any national disaster risk reduction, preparedness or recovery programme;
- In the planning phase for large-scale housing, infrastructure or commercial industrial developments of national significance that may affect the natural environment; and
- In the case of social, economic, infrastructural, environmental, climatic or other indicators that suggest changing patterns of risk which may increase the likelihood of nationally significant disaster impacts.

It is in this context, that Vermaak and Van Niekerk (2004:559) argue that all municipalities and the relevant stakeholders should integrate their Disaster Risk Management plan into municipalities' Integrated Development Plan (IDP). An integrated development plan (IDP) is developed by municipalities as a strategic plan of action to be implemented within its jurisdiction over a period of five years.

The focus of the Disaster Risk Management plan, according to the DMA (2002), is to strengthen the capacity of the municipalities in order to provide effective Disaster Risk Management services. Therefore, municipalities are expected to develop and implement Disaster Risk Management plans in accordance with the DMA (2002) to avoid or minimise the impact of disasters. These plans should include a hazard, risk and vulnerability assessment, mitigating measures, advocacy campaigns and a feedback mechanism from the communities at risk.

In this regard, the Department of Social Development plays an important role, as its social responsibility and poverty alleviation programme, to identify vulnerable communities. Therefore, the National Disaster Management Centre should act as a depository, by developing a national disaster vulnerability atlas or system. This system should enable the various organs of state and other role-players to access maps, graphs, charts and images relating to risks, hazards and potential disastrous scenarios (Vermaak and Van Niekerk, 2004:561-562).

1.2.5 Advocacy campaigns

The NDMF (2005:156-177) requires that all organs of state formulate appropriate public awareness campaigns within the framework of the integrated public awareness strategy. Municipalities are required to include public advocacy campaigns as part of their community participation process that focus on priority risks. Vermaak and Van Niekerk (2004:564) state that municipalities must create awareness amongst their communities to risks such as informal settlement fires, spreading of diseases, floods, extreme weather conditions and pollution. A variety of information strategies such as posters, school visits, print media, radio, television, leaflets, billboards and mobile media (such as advertisements on mini-buses) should be used to inform the communities about potential risks stated above (NDMF, 2005:156-177).

1.3 PREVIOUS RESEARCH

According to Coetzee and Van Niekerk (2012:10), various studies dating as far back as the 1930s were conducted within the field of humanitarian response and Disaster Risk Management. Coetzee and Van Niekerk (2012:10) further maintain that studies

between 1930 and 1970 focused mainly on response and relief efforts following disaster events.

Recent studies since 1980 indicate that the approach to disasters took on either the constructivist or the objectivist view (Quarantelli, 1998:11). From a constructivist point, a disaster is viewed as a social construct where a correlation between social activities (the risks) of human beings and the phenomena (disaster) exists. This means that the negative attitude of the people contributes to the intensity and severity of the disaster.

Consequently, it is understood that human beings bring disasters upon themselves. On the other hand, the objectivist view to disasters is that risks can be quantified mathematically and assessed objectively. Loss of life and property could be calculated adequately and costs could be attached to the losses. It could also be concluded from the above discussion, that if the risks associated with disasters were reduced, the management of disasters would become much easier (Quarantelli, 1998:11-12).

A doctoral study was conducted in Ghana during 2011 to assess the National Disaster Management Organisation's (NADMO) preparedness to protect Ghanaians against disaster events. The findings of the study demonstrate that the National Disaster Management Organisations (NADMO) appear to be preoccupied with a top-down approach towards preparedness for Disaster Risk Management (Oteng-Ababio, 2013:1-11). The study further found that the National Disaster Management Organisations (NADMO) have various challenges such as human resource, transport, financial constraints and lack of capacity to implement adaptation and mitigation strategies effectively. An appropriate institutional framework for Disaster Risk Management was recommended for implementation. This was to improve the National Disaster Management Organisation's (NADMO) ability to improve its preparedness, to protect Ghanaians against disaster events (Oteng-Ababio, 2013:1-11).

Another doctoral study was conducted by a student at the North-West University in South Africa during 2009. The study focused on the origins of the disaster management cycle and the impacts of the various phases of the cycle on the management of disasters. In addition, the study focused on the evolution of the cycle and the application of the cycle in different contexts. A literature review was undertaken to provide a base from which further analyses could be conducted. This

was followed by semi-structured interviews with knowledgeable individuals in the field of Disaster Risk Management. The purpose of this exercise was to triangulate the findings of the literature review. The data gathered from the literature review process were analysed by applying the general systems theory. This theory includes concepts such as equifinality, open systems, feedback arrangements and isomorphism. General systems theory concepts were applied to the interaction between the disaster management cycle and the environment within which it was created (Coetzee, 2010:1-2).

The study found that the origins of the disaster management cycle could be traced as far back as the 1920s. It was also found, that many of the changes that occurred in the disaster-management cycle concepts were the result of the specific contexts within which the cycle was created and applied. Furthermore, the study established that the context, within which a disaster management cycle is created and applied, has considerable effect on the composition of the specific cycle. The open-system nature of disaster management cycle allows many context-specific changes to occur and that many variations of the disaster management cycle were formulated (Coetzee, 2010:1-2).

The South African Local Government Association (SALGA), commissioned the North-West University (NWU) to conduct a study on the status of Disaster Risk Management in South Africa during 2011. This study was conducted to establish the requirements for a coherent, multidisciplinary, multisectoral and a coordinated approach to Disaster Risk Management in South Africa (Botha *et al.,* 2011:97-100). The findings indicate that most municipalities operate at a very low level regarding Disaster Risk Management. Lack of finance and financial management capacity, inadequate and ineffective response and recovery machinery, outdated communication devices, lack of political will and insufficient involvement of government departments were quoted as some of the reasons for ineffective functioning of Disaster Risk Management in South Africa. The study further found that a strong political will and commitment, as well as adequate resources are necessary to add impetus to effective Disaster Risk Management Services (Botha *et al.,* 2011:97-100).

Since 2005, numerous master's and doctoral studies were conducted in South Africa related to disaster preparedness, disaster risk reduction, the role of government in

Disaster Risk Management, Disaster Risk Management functions of municipalities, the role of planning in road transport, and the evaluation of Disaster Risk Management with particular reference to community awareness. However, no study has been conducted pertaining to the development of a Disaster Risk Management model for municipalities within the Free State Province.

1.4 CONCEPTUAL FRAMEWORK

According to Bloomberg and Volpe (2012:86-91), the conceptual framework refers to the models or the thinking the researcher will use to probe into the problem. Furthermore, Bloomberg and Volpe (2012:86-91) state that the conceptual framework is the precise course to be followed when pursuing the study.

This study:

- firstly, seeks to investigate the specific guidelines, principles and requirements for an effective Disaster Risk Management system;
- secondly, to determine the current state of Disaster Risk Management in the Free State municipalities;
- thirdly, to evaluate the current disaster risk mitigation measures that are in place within Free State municipalities; and
- lastly, to determine the socio-economic costs relating to disaster risks within the Free State municipalities.

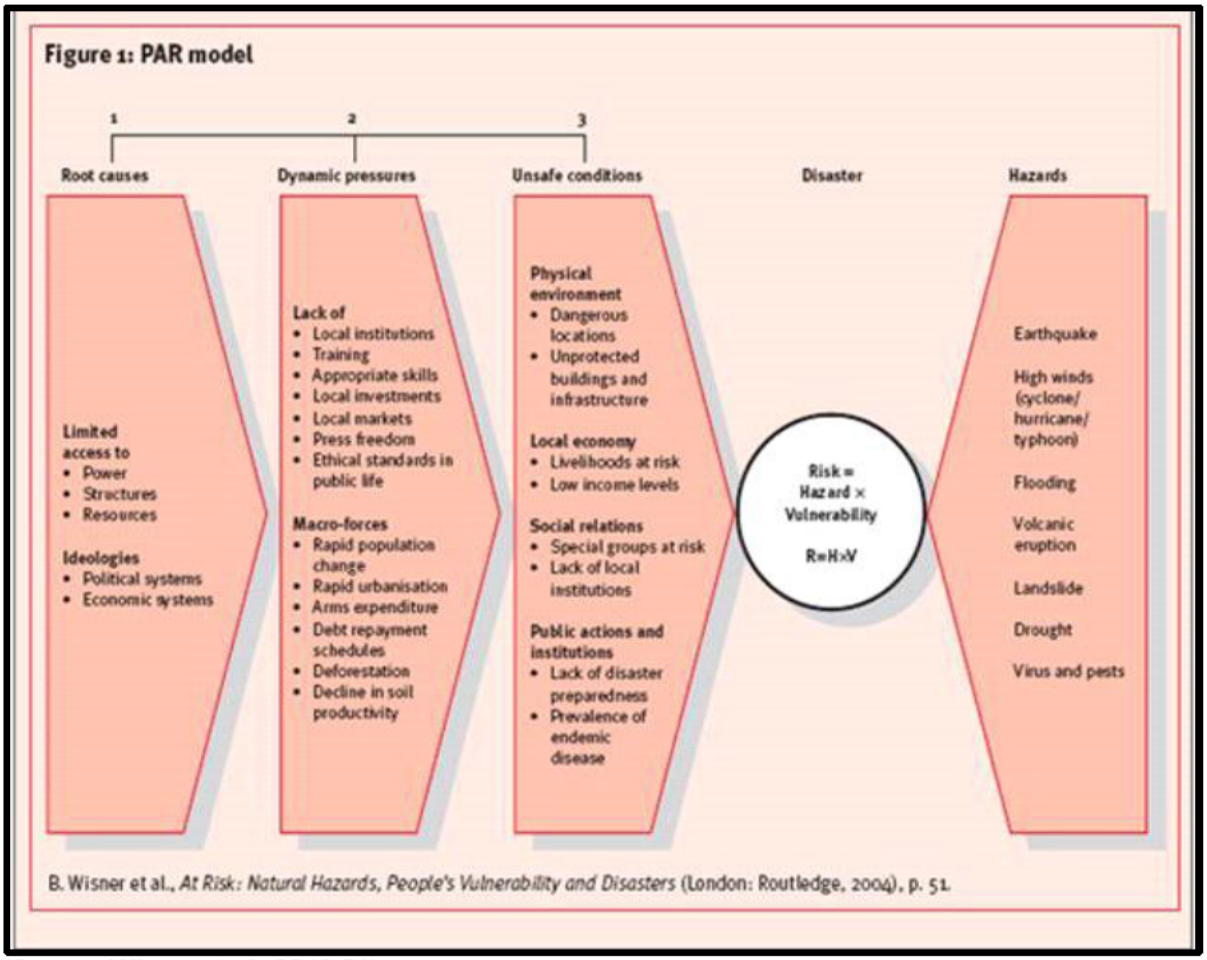
The information from the literature study and the empirical study was used to develop an integrated Disaster Risk Management model. In addition, the elements used in the Pressure and Release model (PAR model) indicated in Figure1.1, as well as the elements from the Disaster Management cycle as indicated in Figure 1.2 were used in developing the Disaster Risk Management model.

1.4.1 The Pressure and Release Model (PAR)

According to Wisner *et al.* (2012:1-5), the Pressure and Release model (PAR), as shown in Figure 1.1, indicates the root causes, the dynamic pressures, the unsafe conditions and the hazards. These factors add tension to the various elements that will consequently determine the extent to which disasters have an impact on the

society in a specific area. The elements that make up the root causes are power, structures, resources, political systems and economic systems. In addition, dynamic pressures are made up of the following elements: lack of local institutions, training, appropriate skills, local investments, local markets, press freedom, ethical standards, rapid population change, rapid urbanisation, arms expenditure, debt repayment schedules and a decline in soil productivity. Wisner *et al.* (2012:156-177) further maintain that the elements that make up unsafe conditions are the physical environment, local economy, social relations, public actions and institutions. The model further highlights hazard such as floods, drought, earthquakes and fires. All these elements are in demand and as a result apply pressure on one another, which may lead to disastrous situations (Wisner *et al.,* 2012:1-5).

Figure 1.1 The Pressure and Release Model (PAR)



(Source: Wisner *et al.*, 2012:51)

4.2 The Disaster Risk Management cycle

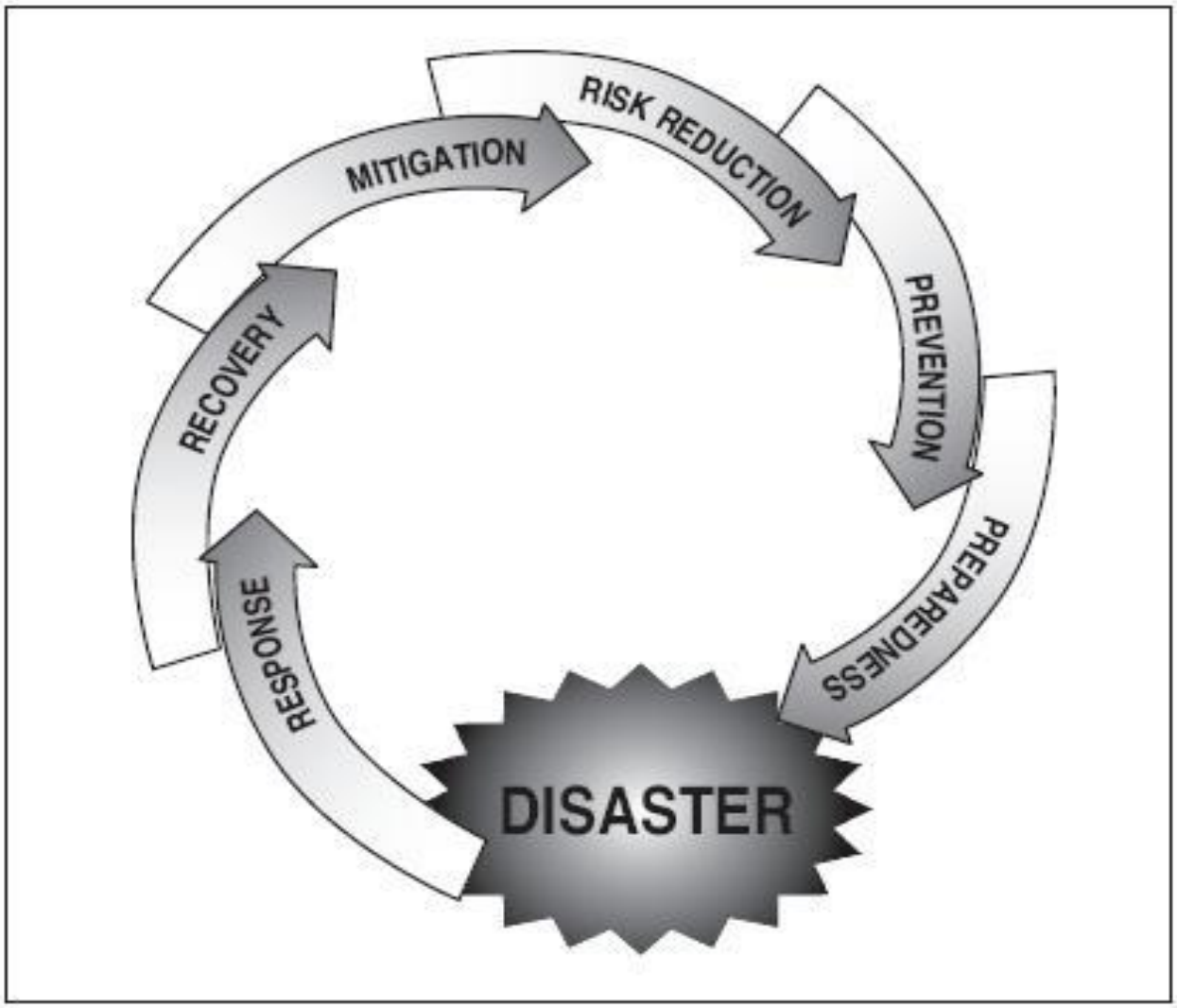
According to Coetzee (2012:2), the Disaster Risk Management cycle evolved over many years. This evolutionary process was determined by how government, business and civil society planned and prepared for the reduction of disaster risks and the associated impacts. Initially there was a planned response during and immediately after a disaster. Subsequently, government authorities took steps to plan for (prior to a disaster), respond to (during a disaster) and recover from a disaster after it had occurred.

The Disaster Risk Management model as represented by Figure 1.2 below comprises three phases:

- before a disaster: to plan for prevention and preparedness;
- to respond to and recover during a disaster; and
- after a disaster, to mitigate and implement risk reduction strategies.

Coetzee and Van Niekerk (2012:2) further maintain that other examples of the disaster management cycle comprise two overarching phases. These can be described as the pre- and post-disaster phases. The pre-disaster phases include aspects such as prevention, mitigation and preparedness, while the post-disaster phase includes aspects such as response, recovery and rehabilitation. The dependant variable for this study is Disaster Risk Management. The independent variables such as response, recovery, mitigation, risk reduction, prevention and preparedness served as the conceptual guide for the development of the questionnaire that was intended for the study, as well as the development of the proposed integrated Disaster Risk Management model (Coetzee and Van Niekerk, 2012:2).

Figure 1.2. The Disaster Risk Management cycle



(Source: Anon, 2015:1 Online)

1.5 THEORETICAL FRAMEWORK OF DISASTER MANAGEMENT

According to Henning *et al.* (2004:24-25), the theoretical framework assists the researcher in positioning himself/herself in the specific field of study, discipline or subject within which the research is conducted. The theoretical framework further supported the researcher in theorising the research from which assumptions were made for the development of an integrated Disaster Risk Management model for the purposes of this study (Henning *et al*., 2004:24-25).

Oluwu (2010:304) maintains that in recent years, significant academic (scholarly) progress has been made globally in the field of Disaster Risk Management. For instance, Oluwu (2010:304) further asserts that disciplines such as sociology,

geography, psychology, civil defence, public administration and developmental studies have had a major influence in the advancement of disaster management and Disaster Risk Management. The DMA (2002) advocates that Disaster Risk Management is an integrated, multisectoral and multidisciplinary process of managing disaster risks. The DMA (2002) further asserts that Disaster Risk Management includes pre-disaster prevention, mitigation and preparedness, as well as post-disaster response, recovery and rehabilitation strategies. Therefore, this study is grounded on a multidisciplinary process as explained above. Thus, the theories of disaster management and Disaster Risk Management that are widely used in the international arena, as well as theories of public administration, municipal administration and development studies were used in this study (Oluwu, 2010:304).

1.6 BACKGROUND TO THE PROBLEM AND PROBLEM STATEMENT

1.6.1 Background to the problem statement

According to the IFRC and Red Crescent Societies (IFRC) (2011:1), South Africa has been affected by 25 major floods since 1980. All nine provinces in South Africa experienced severe flooding during 2009 and 2010. Consequently, 28 of the 278 municipalities in South Africa were declared disaster areas because of the floods experienced during 2009 and 2010. More than 40 lives were lost, and about 20 000 people were displaced (IFRC 2011:1). In addition, 92 (33%) of the 278 municipalities did not budget for disaster risk reduction (DRR) (SALGA 2011:14). A disturbing factor is that 33% (92) of municipalities have thus far failed to make any financial arrangements, regarding Disaster Risk Management. This is an example of the lack of capacity to manage disasters risks effectively in the metropolitan, district and local municipalities in South Africa. Funding for these losses is provided by the National Treasury, which happens only after the occurrence of a disaster. This funding mechanism in itself creates a problem for rural municipalities that experience fiscal limitations and, at the same time, are prone to disaster risks (SALGA, 2011a:45).

In addition, between 1980 and 2010, South Africa experienced 77 disasters such as floods, veld fires, droughts, slime dam disaster and fires in informal settlements resulting in 1 869 deaths. This is an estimated 62.3 deaths per year, which affected 18 456 835 people and cost the country an estimated R3,394 billion in economic

damages (Available: www.preventionweb.net. PreventionWeb 2011. *Disaster Statistics: South Africa*. Accessed 2014).

To illustrate, the Merriespruit slime dam disaster in February 1994 in Virginia, a small mining town in the Free State province, cost about R45 million. The Northern Province floods of January/February 1996 cost approximately R105 million, while the infrastructure damage due to floods in Ladysmith during 1996 cost almost R25 million Although the above discussion is about the Merriespruit and Ladysmith incidences, the challenges that faces the municipalities in the Free State Province are discussed in detail in Chapter 3 of this study (Available: www.preventionweb.net. PreventionWeb 2011. *Disaster Statistics: South Africa*. Accessed 2014).

The South African government promulgated its DMA (2002) the National Disaster Management Framework (NDMF) (2005), as well as other Disaster Risk Management legislation. The purpose of these legislative frameworks is to avert large-scale losses and ensure that Disaster Risk Management is effective. Notwithstanding these attempts by the national government, communities remain vulnerable to the impacts of disaster risks. According to the Disaster Risk Assessment Status Report (SALGA, 2011b:9-10), some of the reasons for poor Disaster Risk Management services are

- firstly, the ineffective implementation of the DMA (2002) and Disaster Management Framework (2005);
- secondly, the lack of human resource capacity for effective financial planning; and
- thirdly, outdated communication systems for effective disaster risk reduction.

These factors led to communities becoming vulnerable to disaster risks (SALGA, 2011b:9-10). However, an integrated Disaster Risk Management model that accommodates the associated risks would go a long way towards improving Disaster Risk Management as a service delivery imperative (SALGA, 2011b:9-10).

1.6.2 The problem statement

Based on the above discussion, the problem statement of this study is: “The lack of an integrated Disaster Risk Management model in municipalities in the Free State

Province.” This has resulted in municipalities’ failure to deliver effective Disaster Risk Management services, which has a negative impact on Disaster Risk Management as a service-delivery imperative.

1.7 RESEARCH AIM AND OBJECTIVES

1.7.1 Research aim

The aim of the study was to contribute positively to the improvement of Disaster Risk Management within municipalities in the Free State Province by developing an integrated Disaster Risk Management model that could assist municipalities in the Free State Province to plan, implement and manage disasters risks effectively.

Furthermore, a detailed discussion and analysis of the research aim is presented in Chapter 4 of this study, which was realised by fulfilling the following six research objectives as discussed below.

1.7.2 Research objectives

To achieve the aim of this study as indicated above, the following six research objectives had to be realised:

- To investigate, through an extensive literature study, statutory legislative policy guidelines and frameworks, government reports and documents, international and local models, principles and requirements of Disaster Risk Management, disaster response, recovery, mitigation, risk reduction, prevention and disaster-risk preparedness.
- To evaluate the current disaster risk-mitigation measures in the Free State municipalities.
- To investigate the current profile of the officials who implement Disaster Risk Management in the Free State Municipalities.
- To investigate the current state of Disaster Risk Management in the Free State Municipalities.
- To investigate the functioning of Disaster Risk Management services amongst the various municipalities in the Free State Province and three metropolitan municipalities, namely the City of Cape Town Metropolitan Municipality in the

Western Cape Province, the Ekurhuleni Metropolitan Municipality in the Gauteng Province and the Mangaung Metropolitan Municipality of the Free State Province.

- To make specific Disaster Risk Management recommendations based on research findings with a view to improving Disaster Risk Management in the Free State Municipalities by developing an integrated disaster risk-management model for municipalities in the Free State Province.

1.7.3 Research questions

The following empirical research questions attempted to achieve the objectives as stated above to fulfil the aim of this study.

- What aspects should be included in an integrated Disaster Risk Management model for Free State municipalities, based on a literature analysis and empirical study?
- What do the literature, statutory frameworks, policy documents, international and local Disaster Risk Management models emphasise concerning the guidelines, principles and requirements for Disaster Risk Management, disaster response, recovery, mitigation, risk reduction, prevention and disaster risk preparedness?
- What current disaster risk-mitigation measures are used in the Free State Province?
- What is the current state of Disaster Risk Management within Free State municipalities?
- What is the socio-economic cost pertaining to Disaster Risk Management within Free State Municipalities?
- What is the profile of the Disaster Risk Management officials in the Free State Province?
- What specific recommendations, based on research findings, could be made with a view to improving Disaster Risk Management services within Free State municipalities by developing an integrated disaster risk management model for municipalities in the Free State Province.

1.8 RESEARCH METHODOLOGY AND DESIGN

1.8.1 Research methodology

According to Leedy and Ormond (2005:12), the research methodology refers to the general approach that the researcher uses to carry out the research project. It dictates the specific tools such as the library, computer and software, measurements techniques, statistics, questionnaires, interviews and language that the researcher selects for the research. In this research, a self-administered questionnaire, a semi-structured interview, as well as documents were used as methodology (Chua, 2013; Leedy and Ormond, 2005:12).

1.8.2 Research philosophy/paradigm

According to McGregor and Murnane (2010:422), there are three types of paradigms, namely positivism, post-positivism or interpretivism and pragmatism paradigms. Welman *et al.* (2005:6) state that the positivism paradigm underlies the natural-scientific method in human behavioural research and hold that research must be limited to what can be observed and measured. The positivism paradigm accepts knowledge to be true, if it is created through scientific methods. On the other hand, post-positivism paradigm assumes that there are many ways to acquire knowledge besides using scientific methods.

According to Williams (2007:73-75), the post-positivism or interpretive paradigm assists the researcher in understanding how people under investigation think, interact and behave in their natural environment. Post-positivism may be certain of interpretations to acquire knowledge. Du Plooy-Cilliers, Davis and Bezuidenhout (2014:78) explain that the pragmatic paradigm refers to the use of a mix of different research methods, as well as modes of analysis to find solutions to specific problems by utilising both qualitative and quantitative research methods.

In this study, the pragmatic paradigm that focuses on mixed research methods as well as modes of analysis was used. The study was mainly informed by the pragmatic paradigm, in other words, a mixed-method research approach that has some aspects of the positivist paradigm (quantitative), and supported by the post-positivistic

paradigm or interpretivism paradigm (qualitative). The post-positivistic paradigm will have validated any gaps generated by the positivistic analysis in order to verify the depth of the identified factors.

Furthermore, in this study, the descriptive and interpretive paradigm was applied by answering the research questions for this study. According to Williams (2007:27), the interpretive paradigm assists the researcher in understanding how people under investigation think, interact and behave in their natural environment. The interpretive paradigm also allowed the researcher to use his or her own judgment and perspective when interpreting data. As a result, this paradigm assumes that there is more than one reality (Maree *et al.,* 2009:37). On the other hand, descriptive research aims to explain occurrences such as human behaviour in administrative sciences by indicating how the variables relate to one another. In addition, it aims to clarify how and in what manner one variable affects another (Welman *et al.,* 2005:23). The descriptive paradigm also assists the research in presenting evidence of interest and significant patterns in existing or new data (Welman *et al.,* 2005:23).

1.8.2.1 Ontology

According to Bloomberg and Volpe (2012:28), ontology refers to assumptions that are based on the nature of the reality. In other words, the meaning for something to exist. Ontology also refers to the nature of the objective facts regarding Disaster Risk Management that exists within Free State municipalities. In this study, the ontological assumptions rests with the municipalities and with the significant Disaster Risk Management stakeholders that form the sample (Bloomberg and Volpe, 2012:28).

1.8.2.2 Epistemology

Paradigms are made up of philosophical elements, namely epistemology and ontology. According to Mouton (2001:138), epistemology refers to the truth or truthful knowledge and how it was acquired. The term is derived from *episteme*, which is the Greek word for ‘truthful knowledge”. Mouton (2001:138) further argues that it is not possible to produce scientific results that are infallible and true for all times and within all contexts. Therefore, Mouton (2001:138) and Flowers (2009) argue that scholars must strive for the most truthful and the most valid results while conducting research.

In view of the latter, this study was based on the interpretivist empiricist epistemologies (Mouton, 2001:138).

1.8.3 Research design and strategy

1.8.3.1 Research design

Research design can be seen as a general plan or blueprint on how the researcher goes about answering the research questions (Cooper and Schindler, 2003:149). This study followed a mixed approach, and therefore both qualitative and quantitative research was used. Mouton (2001:161) and Welman *et al.* (2005:6-7) contend that qualitative research methods reflect certain approaches to knowledge production and include any research that makes use of qualitative data. According to Creswell (2007:6-17) the sequential data collection strategy is where few people are asked about the phenomenon to get a better, deeper and complete understanding of the phenomenon. This is pertinent to this study, which is concerned with information that may contribute to resolving the challenges of Disaster Risk Management within the municipalities in the Free State Province and therefore the sequential strategy was adopted in this study (Mouton, 2001:161; Welman *et al.,* 2005:6-7; Creswell 2007:6-17).

The literature study for this research project is based on a qualitative study, which includes policy documents, journal articles, books, conference papers, internet sources and government reports on Disaster Risk Management, followed by the use of an interview schedule to collect information based on the perceptions of officials about Disaster Risk Management. The purpose of quantitative research in this study was to evaluate objective data obtained from using a structured questionnaire. The data of quantitative research consist of numbers to emphasise the measurement and analysis of causal relationships between variables (Welman *et al.,* 2005:6). According to Wittek (2013), the use of qualitative and quantitative designs seeks to consolidate or understand the research problem better, as well as to approach the problem from a different perspective. The study therefore also adopted a survey, since the focus was on the identification and comparison of factors or aspects influencing Disaster Risk Management within different municipalities (Mouton 2001:16; Welman *et al.,* 2005:6-7).

1.8.3.2 Research strategy

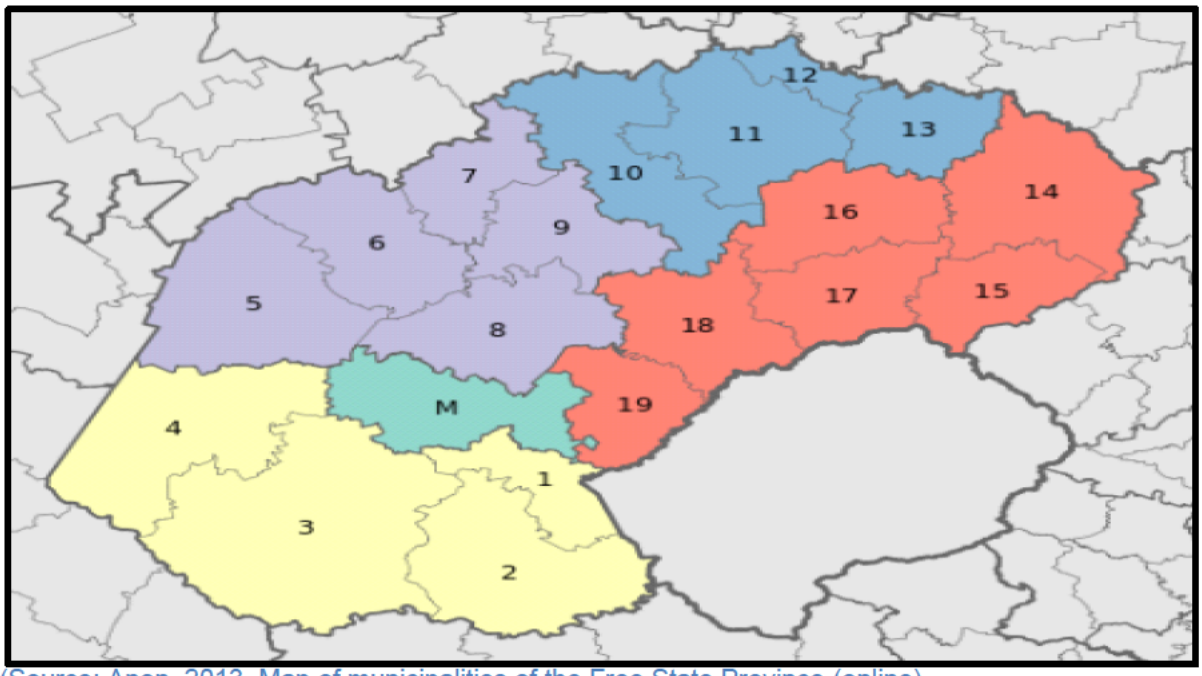
A research strategy is a plan that a researcher adopts so that systematic and orderly research is produced in an effective manner. This study applied the general systems theory as the research strategy. According to Ingelstam (in Coetzee and Van Niekerk, 2012:1), the characteristics of the general systems theory is ideal for studying multifaceted concepts that are related to the Disaster Risk Management cycle and applicable models.

This study included both qualitative and quantitative research methods. According to Welman *et al*. (2005:6-7), qualitative research methods portray certain approaches to knowledge production. It includes any research that makes use of qualitative data. This study used qualitative research that is concerned with information that may assist in resolving the challenges of Disaster Risk Management within municipalities in the Free State Province. However, the reason for quantitative research in this study was to evaluate objective numerical data and to stress the extent and analysis of causal relationships between and amongst the various variables (Welman *et al.,* 2005:6-7).

1.8.4 Population

Since the aim of this study was to develop an integrated Disaster Risk Management model for municipalities within the Free State, the population comprised Free State Provincial Disaster Management Centre, the Mangaung Metropolitan Municipality, the 4 district municipalities, and the 19 local municipalities within the Free State Province, and the Free State provincial departments as indicated in Figure 1.3 below.

Figure.1.3: Map of the Free State indicating the various municipalities of the Free State Province



(Source: Anon, 2013. Map of municipalities of the Free State Province (online)

Table 1.1 Free State districts (number indicates the local municipalities)

Colour	Metropolitan/District Municipality	Letter/Number indicating the Local Municipality
Yellow	Xhariep District	1,2,3,4
Green	Metropolitan Municipality	M
Purple	Lejweleputswa District	5, 6,7,8,9
Blue	Fezile Dabi District	10, 11, 12, 13
Brown	Thabo Mofutsanyana	14, 15, 16, 17, 18, 19

(Source: Researcher's own Interpretation: 2018)

In addition to the municipalities as indicated in Figure 1.3 below, the following government departments, business and private sector as well as the relevant stakeholders also formed the population:

- The Free State Provincial Disaster Risk Management Centre (FSPDMC)
- The Provincial Disaster Risk Management Advisory Forum (PDMAF)
- Mangaung Metropolitan Disaster Management Centre

- Department of Cooperative Governance and Traditional Affairs, Free State Province (COGTA-FS)
- The Municipal Disaster Risk Management Advisory Forum (MDMAF)
- The Joint Operation Centre (JOC)
- The Bloemfontein Chamber of Commerce and Industry (BCCI)
- The African Farmer's Association of South Africa (AFASA)
- The South African Police Service (SAPS), Bloemfontein
- The Emergency Medical Services (EMS), Bloemfontein
- The South African Defence Force (SANDF), Bloemfontein
- The South African Weather Service – Bloemfontein
- Free State Public Works, Roads and Transport
- The Free State Provincial Department of Social Development
- Provincial Department of Education
- Free State Department of Health
- The Free State Department of Rural Development and Land Reform
- ESKOM

1.8.4.1 Sampling

Sampling is defined as the process of choosing a small group of respondents from a larger, defined target population. The supposition is that the results discovered about the small group will allow the researcher to draw conclusions relating to the larger group (Hair, Bush and Ortinau, 2006:3-33).

For this study, the sampling method probability random and the convenience sampling method were used. The random sampling method was used to select 12 local municipalities (three local municipalities from each district municipality) randomly. Leedy (1985:154) contends that randomisation means selecting a sample from the whole population in such a way that the characteristics of each unit of the sample approximate the characteristics of the total population. Salkind (2009:90-91) asserts that the most common type of probability sampling procedure is the simple random sampling method. In this sampling method, each member of the population had an equal and independent chance of being selected to be part of the sample. In convenience sampling, respondents are selected on the premise that they are readily

available or easily accessible (Welman *et al.,* 2005:69-70). This method was used to select representatives from various government departments, forums and other stakeholders as indicated in the sample listed below (Salkind 2009:90-91; Welman *et al.,* 2005:69-70).

In this study, a structured questionnaire was used to elicit information from senior Disaster Risk Management officials of the metropolitan, district and local municipalities as listed in below:

- Mangaung Metropolitan Municipality
- Xhariep District Municipality
- Lejweleputswa District Municipality
- Fezile Dabi District Municipality
- Thabo Mofutsanyane District Municipality
- Naledi Local Municipality
- Mokohare Local Municipality
- Kopanong Local Municipality
- Tokologo Local Municipality
- Tswelopele Local Municipality
- Nala Local Municipality
- Moqhaka Local Municipality
- Ngwathe Local Municipality
- Metsimaholo Local Municipality
- Nketoana Local Municipality
- Maluti-a-Phofung Local Municipality
- Phumelela Local Municipality

Semi-structured interviews by means of an interview schedule were conducted with a Disaster Risk Management representative from the following government departments, forums and other stakeholders:

- The Free State Provincial Disaster Risk Management Centre (FSPDRMC)
- The Provincial Disaster Risk Management Advisory Forum (PDMAF)
- The District Disaster Risk Management Centres (DDMC)

- The District Disaster Risk Management Advisory Forum (MDMAF)
- Cooperative Governance and Traditional Affairs (COGTA-FS)
- The Joint Operation Centre (JOC)
- The Bloemfontein Chamber of Commerce and Industry (BCCI)
- African Farmer's Association of South Africa (AFASA)
- The South African Police Service within the Free State Province (SAPS)
- The Emergency Medical Services (EMS – Free State)
- The South African Defence Force (SANDF), Bloemfontein
- Free State Department of Social Development
- Free State Department of Education
- Free State Department of Health and
- Free State Department of Rural Development and Land reform
- ESKOM
- Red Cross

1.8.5 Research instruments

According to Saunders *et al.* (2009:395), the selection of a research instrument depends on the purpose of the research. Saunders *et al.* (2009:395-396) further explain that there are two types of questionnaires, namely self-administered questionnaires and interviewer-administered questionnaires. A self-administered questionnaire is a data collection strategy in which the respondents read the questions, then choose their preferred answer and record it in the absence of the interviewer. In this study, a self-administered questionnaire was sent to the various municipalities that formed the sample. The most senior official responsible for Disaster Risk Management in these municipalities would fill in the answers in the questionnaire (Saunders *et al.,* 2009:395-396).

An interview schedule consisting of structured (closed-ended) and unstructured (open-ended) questions was used to conduct semi-structured interviews. According to Salkind (2009:144-145), semi-structured interviews are more flexible for both the interviewer and the interviewee. This flexibility allows the interviewer to probe for more information to get a better understanding of the information, facts and uncertainties, provided by the interviewee. For the purposes of this study, the interviews were

conducted with the Disaster Risk Management representatives from the government departments, the business sector and non-governmental sector involved with disaster risk reduction.

Tsatsire (2008:230) suggests that the following aspects ought to be taken into consideration when compiling a questionnaire:

- Confidentiality should be assured;
- If applicable, a choice of answers should be given on the questionnaire;
- The layout of the questionnaire is important, and provision for adequate space for answers should be made;
- The questions should be formulated in such a manner that they are not offensive;
- Care should be taken that questions should not give cause for emotive language;
- Questions should not require any calculations; and
- The questions should be formulated in such a manner that they are short, simple and to the point.

For the purpose of this study, the questionnaire was designed to have fully structured statements. Confidentiality was assured and obtained by using a covering letter for both the self-administered questionnaire and the interview schedule.

1.8.6 Data collection

Tsatsire (2008:229) states that there are various methods of collecting data, namely questionnaires, personal interviews, observation of events as they happen and abstraction, amongst others. According to Salkind (2009:142), a questionnaire is a form that contains a set of questions based on the research project, which needs to be completed by the respondents. Bless *et al.* (1995:106-107), on the other hand, assert that a questionnaire is a data collection instrument that consists of a standardised set of questions. These questions, which are relevant to the research topic, have to be answered in writing by the respondents.

One of the basic tools used in qualitative research is the interview schedule. Interviews can take the form of an informal question-and-answer session or structured, detailed interaction between the interviewer and interviewee (Salkind, 2009:194-195). Again, Salkind (2009:195) emphasises that interviews contain two general types of questions, namely structured (closed-ended) and unstructured (open-ended) questions. Brynard *et al.* (2006:40-41) also assert that interviews are one of the most frequently used techniques of collecting data, because the researcher can explain the questions if the respondents do not understand them.

In this study, the semi-structured interviews were conducted using an interview schedule. Senior representatives of the government departments, forums and other stakeholders as indicated in the sample were interviewed. Where officials were not available for a face-to-face interview, a telephonic interview was conducted. Further, a self-administered questionnaire was designed to have fully structured statements and questions that were be completed by the various municipalities as indicated in the sample. Yet again, these self-administered questionnaires comprised open-ended and close-ended questions. These questionnaires were distributed to the relevant municipalities as indicated in the sample. The manager responsible for Disaster Risk Management in the Free State Province would assist in distributing and collecting the responses from the relevant municipalities.

1.8.6.1 Data analysis

According to Leedy and Ormrod (2005:148-150), data analysis is a continuous process of describing, classifying and interpreting data. In addition, data analysis is the conversion of raw data into valuable, meaningful information for the researcher. These various categories and groups of data and the relationships that exist between and amongst them should be identified in order to give meaning and to construct theory. Henning *et al.* (2004:6-7) maintain that the process of data analysis will assist the researcher in answering the research questions, as well as to achieve the purpose of the research. In the course of organising the data trends, themes and or contradictions may emerge that would be highlighted for readers to note and for the researcher to follow up (Brassington and Petit, 2006:1-2).

In this study, the researcher was assisted by a statistician experienced in qualitative and quantitative research methodologies. The support of the statistician was solicited in developing the questionnaire and interview schedule; and secondly, in providing guidance in interpreting and analysing the results from the data collection instruments. As indicated in the sample, the instruments referred to in this study are the self-administered questionnaire and interview schedule.

The data analysis included a description, as well as a summary of the information obtained from the questionnaire and interview schedule. Simple, graphs, bar charts, tables and percentages were used to present data that could be viewed from different perspectives. In doing so, anomalies were identified and pursued. Consequently, the data obtained from the literature study, as well as from the empirical study contributed to the development of an integrated Disaster Risk Management model for municipalities in the Free State Province.

1.9 PILOT STUDY

A pilot study was conducted to assess the research instrument and data feedback. According to Robson and McCarten (2002:59), a pilot study is a trusted method of establishing “what is happening, to seek new insight, to ask questions and to assess phenomena in a new light, prior to the substantive research”. In this regard, assistance from some experts in the field of Disaster Risk Management were sought to complete the questionnaire and the interview schedule. The subject-matter experts were the Director of Disaster Risk Management from the University of the Free State, The Head of Department of the Disaster Management Directorate, from the University of South Africa and the Mangaung Metropolitan Councillor responsible for Disaster Risk Management. Inconsistencies, ambiguities and uncertainties found in the instruments were corrected before the actual research was conducted. The purpose of this exercise was to ensure the validity and reliability of the questionnaire and the interview schedule (Robson and McCarten, 2002:59).

1.10 ETHICAL CONSIDERATIONS

According to Bless *et al.* (1995:102-103), ethical issues in research are universal, specific norms. Cultures and values, which play an important role, must be considered.

Informed consent was obtained from the respondents. The respondents were free to participate and withdraw at any time during the research process. Trust developed between the researcher and respondents to obtain information freely and willingly. In this regard, the nature and purpose of the interview was discussed so that respondents were fully informed of what was expected of them and why. Therefore, the researcher and the respondents were aware of and observed the following ethical standards.

1.10.1 Informed Consent

The purpose of the research was made known to the Respondents and their consent to participate in the research was voluntary.

1.10.2 Letters of Consent

A letter was sent to the municipal managers of the selected municipalities to seek their consent for the voluntary completion of the questionnaire. It was requested that these questionnaires be completed anonymously. Another letter was sent to the chairperson of the Joint Operation Centre (JOC) and the senior disaster management officials of government and business sector that formed the sample of this study. Their consent to participate voluntarily in the interviews was sought.

1.10.3 Privacy

The confidentiality of information and anonymity of respondents were protected at all times (Bless *et al.,* 1995:102-103).

1.11 LIMITATIONS

The study could have been subjected to various external factors, such as the assurance and readiness of the Respondents to participate in the study. Another consideration is that the various municipalities functioned at different levels of readiness to offer Disaster Risk Management as a service-delivery imperative. The different provinces in South Africa also constantly face financial and human-resource challenges. All these factors could have a possible influence on this study, which was beyond the control of the researcher.

1.12 DEFINITION OF CONCEPTS

In terms of the NDMF 2005, the following definitions were used in this study.

1.12.1 Disaster

A disaster is the serious disruption of the normal day-to-day functioning of a community because of a natural or man-made activity causing widespread losses. The seriousness of the losses/damages and/or destruction is of such a nature that assistance from other outside sources are needed until they are able to function as they used to before the disruption (UNISDR, 2009:9).

A disaster refers to a natural or human-caused event, occurring with or without warning, causing widespread human, material economic or environmental losses. A disaster is a function of the risk process, because it results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of the disaster risk (NDMF, 2005:227).

1.12.2 Disaster Risk Management

Disaster Risk Management (DRM) can be defined as a series of actions aimed at disaster risk reduction in endangered regions and mitigating the extent of such disaster risks (UNISDR, 2009:10). Disaster Risk Management refers to the administrative decisions and coping capacity used to lessen the impact of a hazard. In addition, The UNISDR (2009:10) refers to Disaster Risk Management as the structural and non-structural measures taken to prepare for, to mitigate against and or prevent the negative influences of disasters. NDRMF (2005:228) refers to Disaster Risk Management as

> the systematic process of using administrative decisions, organisations, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural and anthropological disasters. It comprises all forms of activities, including structural and non-structural measures to prevent or to limit mitigation and preparedness to the adverse effects of hazards (UNISDR, 2009:10).

1.12.3 Disaster Risk Reduction

This concept is specific to disasters and it refers to the factors that must be used to lessen the risks associated with disasters. When these risk-mitigating measures are introduced, the communities become less vulnerable to the associated disasters (UNISDR, 2009:10-11).

Disaster risk reduction refers to the elements considered with the possibility of minimising vulnerabilities and disaster risks throughout a society. It refers to the measures instituted to avoid (prevent) or to limit (mitigate and prepare for) the adverse effects of hazards within the broader context of sustainable development (NDMF, 2005:228-229).

1.12.4 Hazards

A hazard refers to a potentially damaging physical event, phenomenon and/or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Hazards can include latent conditions that may represent future threats and can have different natural (geological, hydro-meteorological) or human processes (biological and technological hazards) (NDMF, 2005:230).

1.12.5 Mitigation

According to the NDMF (2005:231), mitigation refers to the structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards on vulnerable areas, communities and households (NDMF, 2005:231).

1.12.6 Organ of State

In terms of the NDMF (2005:233), an organ of state refers to any state department or administration in the national, provincial or local sphere of government. It may include any functionary or institution exercising a power or performing a function in terms of the *Constitution* (1996), or any functionary or institution exercising a public power or performing a public function in terms of any legislation.

1.12.7 Preparedness

Preparedness refers to the activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations (NDMF, 2005:233).

1.12.8 Disaster Risk

Tobin and Montz (in Van der Waldt *et al.,* 2013:254) maintain that risk is the product of the probability of an occurrence and the expected loss due to vulnerability to the occurrence. In terms of the NDMF (2005:235), a risk (disaster risk) entails the probability of harmful consequences or expected losses such as deaths, injuries, property, livelihoods, disrupted economic activity or environmental damage resulting from interactions between natural or human-induced hazards and vulnerable conditions.

1.12.9 Risk Assessment

According to the United Nations International Strategy for Disaster Reduction (UNISDR) (2002:6), risk assessment can be seen as the process of determining the nature and extent of risks by analysing potential hazards as well as by analysing existing situations of vulnerability that could pose a potential threat to the community.

Risk assessment refers to a process to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that could have a potential threat or harm to people, communities, property, livelihoods and the environment on which they depend (NDMF, 2005:235).

1.13 PROVISIONAL CHAPTER LAYOUT

1.13.1 Chapter One: Introduction and background

A general introduction and background of the study will include an overview of Disaster Risk Management, the problem statement, the research question, research objectives, methodology, and ethical considerations.

1.13.2 Chapter Two: Theoretical overview of Disaster Risk Management in South Africa

As part of the literature review chapters, this chapter reviews the legislative prescripts regarding Disaster Risk Management. This includes published and unpublished work and educational journals on the subject matter.

1.13.3 Chapter Three: State of Disaster Risk Management in all Free State municipalities and three South African metropolitan municipalities

An in-depth study of Disaster Risk Management services offered by all local, district and the metropolitan municipalities in the Free State Province was conducted. This included the Free State Provincial Disaster Management Centre, the Mangaung Metropolitan Municipality as well as a comparative analysis of three Metropolitan Disaster Management Centres in South Africa.

1.13.4 Chapter Four: International and national models of Disaster Management

As part of the literature review chapters the discussion in this chapter focuses on local and international models/frameworks and strategies on Disaster Risk Management.

1.13.5 Chapter Five: Research design and methodology

This chapter explains and discusses the research methodology, specifically the research design, the population, sample data-collection techniques employed and the analysis of data. Data are presented using tables and graphs, followed by a statement of the findings and the analysis of the data. Major themes are presented, followed by a discussion on the findings.

1.13.6 Chapter Six: Findings, analysis and interpretation of results

A framework for data analysis is presented in Chapter 6. This includes the quantitative, as well as the qualitative findings, analysis and interpretation.

1.13.7 Chapter Seven: Recommendations and summary

In this chapter, the conclusion and recommendations are presented. The proposed integrated Disaster Risk Management model is also presented as a recommendation. Recommendations for future research are included.

1.14 CONCLUSION

This chapter provided a guideline on how the project were carried out. Therefore, this chapter managed to highlight the motivation of the research, the problem statement, objectives and research methods used. It further provided clarity insofar as the concepts that form the foundation of the research are concerned. As a result, the chapter emphasised the sequence which the dissertation followed in terms of the research project and outlined the focus areas of the research.

As part of the literature study, the theoretical review of Disaster Risk Management in the South African context is discussed in Chapter 2.

CHAPTER TWO: THEORETICAL OVERVIEW OF DISASTER RISK MANAGEMENT IN SOUTH AFRICA

2.1 INTRODUCTION

According to Van Niekerk (2011:3), there was a significant international focus on the reduction of disaster risks resulting from the extreme nature and impact of these events on communities. International disasters are mainly caused by extreme natural events including floods, earthquakes, and volcanoes that are part of the natural cycle where most countries in the world are exposed to these events to some degree. During the first decade of the 21st century alone, numerous incidents of earthquakes, landslides, thunderstorms, hurricanes, infernos, tornadoes, floods, wildfires, tsunamis, volcanic eruptions, dam wall collapses, chemical spillages, explosions, severe droughts, violent uprisings and massacres were reported around the world, with varying degrees of destruction. These incidents pose serious threats to developing countries such as in Sub-Saharan Africa, which are more vulnerable to the impact of large-scale disasters risks (Oluwu, 2010:303-304; Schipper and Pelling, 2006:19; Ngcamu 2015:14).

Oluwu (2010:304) maintains that in recent years, significant academic (scholarly) progress has been made globally in the field of Disaster Risk Management. Oluwu (2010:304) further illustrates that fields of study such as sociology, geography, psychology, civil defence, public administration and developmental studies have had a major influence on the advancement of disaster management and Disaster Risk Management.

The purpose of this chapter is to explore the statutory and regulatory legislative frameworks concerning Disaster Risk Management in South Africa, and then provide a theoretical overview of Disaster Risk Management in the South African context. This chapter commences with the emergence and reforms of Disaster Risk Management. It provides a disaster risk profile of South Africa and the effects of climate change on the country. Thereafter, an overview of related concepts and mechanisms of Disaster Risk Management is provided. The focus of the discussion is next on the national statutory and regulatory framework of Disaster Risk Management and disaster risk reduction, followed by the Disaster Risk Management structures, institutional

arrangements for Disaster Risk Management and role-players to promote Disaster Risk Management. The chapter concludes by discussing the role of communities and community organisations with the municipal integrated development planning process, which includes the Disaster Risk Management plans of municipalities.

2.2 EMERGENCE AND REFORMS OF DISASTER RISK MANAGEMENT IN SOUTH AFRICA

Vermaak and Van Niekerk (2004:567) state that during World War II the 1940s, after the bombings of London, South Africa introduced its notion of civil defence to safeguard the lives of people in the event of disasters. Directly after World War II, the notion of civil defence disappeared but it was reintroduced during 1957 by the then Minister of Justice to protect the apartheid regime and its people from attacks by freedom fighters. During 1959, the Council for Civil Defence Services was introduced, to be replaced by the Directorate of Civil Defence in 1962 (Vermaak and Van Niekerk, 2004:567).

In 1966, the *Civil Defence Act 39 of 1966* was introduced. At that stage, the national government was responsible for the function of civil defence, while the rest of the government spheres were excluded from this function. During 1977, the *Civil Defence Act, 1966* was replaced by the *Civil Defence Act 67 of 1977*, which included all tiers of government to govern the function of civil defence to safeguard the lives of people in the event of disasters. Since 1978, the function of civil defence services has been rendered under the auspices of the *Civil Defence Act, 1977* and the *Fundraising Act 107 of 197*8.

The *Civil Protection Act, 1977* focuses on operations of civil protection throughout government as well as make provision for the promotion of civil defence at all levels of government, whereas the *Fund Raising Act, 1978* provides specific means for the funding of social rehabilitation after a disaster has occurred. The *Civil Protection Act, 1977* also provides that the then Minister of Provincial Affairs and Constitutional Development could declare a “state of disaster”. The *Fund Raising Act, 1978* provides that the President could also declare a disaster to provide relief to victims of disasters (Van der Waldt *et al.,* 2014: 263; Van Niekerk, 2006:99; Vermaak and Van Niekerk 2004:567).

Van der Waldt *et al.* (2014:263) further argue that South Africa did not have a holistic approach to disaster and disaster risks until 1994. The reason for this is that until 1994, the focus was on civil protection or civil defence and the provision of civil protection services rather than on disaster management. Vermaak and Van Niekerk (2004:567) maintain that this situation continued until the beginning of 2004. During the same time on the international front, the United Nations member countries realised that it was time to deal with disasters through concerted international action. Following the adoption of resolution 44/236 of 1989, the United Nations launched the International Decade for Natural Disaster Reduction on 1 January 1990, with the aim to reduce the loss of life, property damage and the subsequent social and economic disruptions because of natural disasters. This initiative pathed the way for a paradigm shift from civil protection in South Africa to a focus on disaster management and risk reduction. Since 1990, the term “civil protection” was replaced by disaster management and it was widely used when referring to the management of disasters (Van Niekerk, 2006:98-99).

According to van Niekerk (2011:3), there was a significant international focus on the reduction of disaster risks because of the extreme nature and impact of these events on communities. International disasters are mainly caused by extreme natural events, including floods, earthquakes, and volcanoes that have been part of the natural cycle where most countries in the world are exposed to these events to some degree.

Since 1996, the South African Cabinet resolved that a National Disaster Management Committee be established at national sphere of government. However, the National Disaster Management Committee was replaced by an Inter-Ministerial Committee for Disaster Management (IMC), which established an Interim Disaster Management Centre that was comprised of various national government departments. The Inter-Ministerial Committee for Disaster Management was also responsible for producing the Green Paper on Disaster Management that was published in 1998. The aim of the Green Paper on Disaster Management was to outline draft management strategies to deal with disaster and risk in South Africa in a more comprehensive and cooperative manner. The contents of the Green Paper on Disaster Management 1998 was amended with the intention to draft the national White Paper on Disaster Management 1999 to give effect to the policy on disaster management. The purpose of the White

Paper on Disaster Management 1999 was to set out the South African government's disaster management policy (DPLG, 2008b:4-8; Van der Waldt *et al.,* 2007:256).

It informed the public of governments objectives as well as how to achieve the set objectives and secondly, to inform government agencies and other organs of state of the objectives and how to achieve these objectives. The *White Paper on Disaster Management, 1999* gave effect for the publication of the two Disaster Management Bills. The first was published in 2000 and the second in 2001, followed by the promulgation of the DMA (2002) that was enacted on 15 January 2003 (DPLG, 2008b:4-8; Van der Waldt *et al.,* 2007:256).

According to Ngcamu (2015:66), the reforms of the South African disaster management legislative and policy frameworks were applauded internationally as "ground-breaking" work to promote disaster risk reduction. The reforms of the disaster managements' legislative frameworks and policy were influenced by international developments on disaster management and disaster risk reduction such as the United Nations Disaster Management Training Programme (UNDPs) of the mid 1990s and the International Decade for Natural Disaster Reduction and the International Strategy for Disaster Reduction that was introduced in 2000.

The DMA (2002) advocates that Disaster Risk Management is an integrated, multisectoral and multidisciplinary process of managing disaster risks. The DMA (2002) further proposes that Disaster Risk Management includes pre-disaster prevention, mitigation and preparedness as well as post-disaster response, recovery and rehabilitation strategies.

Botha and Van Niekerk (2013:2) emphasise that the DMA (2002) makes provision for the decentralisation of Disaster Risk Management within the three spheres of government. Section 29 and section 43 of the DMA (2002) provide for each sphere of government to fulfil its disaster management role in that national, provincial and local spheres have to establish Disaster Management Centres. The decentralisation of Disaster Risk Management requires that local governments have to incorporate Disaster Risk Management into their structures and integrated development plans.

Section 42 of the DMA (2002) provides that each district and metropolitan municipality must establish a Municipal Disaster Management Framework and a Disaster Management Centre. Botha and Van Niekerk (2013:2) argue that the DMA (2002) and the NDMF (2005) provide that the responsibility of Disaster Risk Management and disaster risk reduction lies with the metropolitan and district municipalities.

According to IFRC and Red Crescent Societies (2011:11), one of the main criticisms in the application of the DMA (2002) is the fact that the burden of developing and implementing Disaster Risk Management plans falls on the local municipalities. Local municipalities can be seen as the “foot soldiers” of Disaster Risk Management, since they withstand the worst of disasters that befall the communities. This is where the impact of disasters is at its greatest; yet, very little funding is allocated to this level for the management of disaster risks.

Furthermore, representation of local municipalities in the Inter-Ministerial Committee on Disaster Risk Management (ICDM) and the NDMAF, where major decisions and policy matters are discussed, is negligible compared to representation from provincial and national level at the ICDM. IFRC and Red Crescent Societies (2011:11) argues that for effective Disaster Risk Management services, there must be acceptable levels of administration of technical matters on the one hand and adequate administrative support on the other hand. The technical aspects include sufficient and appropriate resources such as finances and equipment, whilst the administrative aspect is the provision of skilled personnel to manage and administer disaster risks (IFRC and Red Crescent Societies, 2011:11).

Notwithstanding the above, municipalities must prepare their plans according to the requirements of the DMA (2002). For this reason, *The Disaster Management Amendment Act, 2015* clarifies, inter alia, the policy focus to ensure that if municipalities have the capacity to administer and provide an integrated, coordinated Disaster Risk Management service, then they are compelled to do so.

In the light of the above, the *Disaster Management Amendment Act, 2015* makes provision in Section 16(3) for local municipalities to establish capacity for the development and implementation of its disaster management function and disaster management plan. Additionally, section 16(4) of the *Disaster Management*

Amendment Act, 2015 makes provision for the establishment of a Disaster Management Centre within a local municipality, in consultation with the relevant district municipality. From the above it is clear that since 1994, South Africa has established itself as one of the first African countries to legislate Disaster Risk Management comprehensively. Initially the function of Disaster Risk Management at local sphere was the responsibility of metropolitan and district municipalities. However, the *Disaster Management Amendment Act, 2015* provides that local municipalities have to develop the capacity for the establishment of a Disaster Management Centre in consultation with the relevant district municipality.

The next section discusses the profile of South Africa in relation to disaster risks.

2.3 DISASTER RISK PROFILE OF SOUTH AFRICA

The African Union Report on Disaster Risk Reduction (2006:2) explains that a variety of disasters occurs in Sub-Saharan Africa every year. The absence of appropriate legislative and policy frameworks, insufficient and inadequate resources further exposes the vulnerability of these countries to disasters. Oluwu (2010:303-304) avers that the inability of African countries to manage and reduce disasters effectively is a direct result of inappropriate planning and inadequate funding. In addition, reliance on outdated or dysfunctional systems of Disaster Risk Management, lack of capacity and the inability to access technological data further contribute to these disasters. The result is that more people are adversely affected by various types of disasters every year. Climate change, which is the main cause of unpredictable weather patterns across the world, contributes to the unexpected disasters and events. The severity and impact of these events such as floods, fires, droughts and other disasters differ from one country to another.

South Africa is subject to a wide variety of natural and human-induced hazards that often leads to disaster events such as floods, and storm related events, droughts and water shortages, fires, including urban and rural fires, dam failures, mining-induced earthquakes, sinkholes, epidemics, spillages of hazardous waste and even acid mine drainage. Other forms of human-induced hazards that often lead to disaster events in South Africa are the rapid spread of fires and even flash floods in informal settlements. From 1980 to 2010, 77 disaster events resulted in the deaths of about 1 869 people

and these events affected the lives of about 18 million people. Floods and storm events, droughts and fires are the most frequently occurring natural disasters in South Africa. A total of 57,1% of people were killed as a result of floods during 1980 till 2010, while a total of 94,7% of people were affected by droughts during the same period (IFRC, 2011:18; Ngcamu 2015:15-16).

Botha and Van Niekerk (2013:2-3) maintain that South Africa is not regarded as a country at risk for disasters, but many risks and hazards such as structural fires, veld fires, droughts, severe weather events, floods, hailstorms, road accidents, sinkholes, and earthquakes as a result of mining activities occur on a regular basis. Other risks and hazards, including the outbreak of diseases and epidemics such as meningitis, malaria, cholera, tuberculosis and HIV also pose a threat to the well-being and health of the people of South Africa. Botha and Van Niekerk (2013:2) claim that another concern is that the majority of the population in South African live in vulnerable conditions as a result of poverty, low standards of living and high levels of unemployment. High poverty levels in South Africa contribute to the fact that disadvantaged communities are extremely vulnerable to disasters (Botha and Van Niekerk, 2013:2-3).

According to the IFRC Societies (IFRC 2011:18-19), the population of the country totals approximately 50,59 million people. The country has nine provinces and 278 local governments. The smallest province, Gauteng, has the highest population of 11,3 million people, while KwaZulu-Natal, the second-most densely populated province has a total of 10,8 million people. Two provinces, namely the Limpopo and the Eastern Cape Provinces, are experiencing a net out-migration of its people. The opposite is true of the Western Cape and Gauteng Provinces, which experience a net inflow of migrants as well as an urbanisation level of about 56%. In the Limpopo, Mpumalanga, Eastern Cape, KwaZulu-Natal and North-West Provinces, most of the people live in rural areas. The opposite is true for the Northern Cape and the Free State Provinces, where most of the people are urbanised (IFRC, 2011:18-19).

South Africa comprises an area of approximately 128 000 km². It has a coastline that covers 2 985 km², with the Indian Ocean to the east and the Atlantic Ocean to the west. The surface of the country is divided into the interior plateau and the land between the plateau and coastal areas known as the Great Escarpment lies between

the boundaries between the interior plateau and the land between the plateau and the coastal areas. The Great Escarpment refers to the continuous range of mountains with its highest point at 3 482 m in the Drakensberg Mountain Range. The country has six rainfall regions that consist of higher-rainfall areas towards the east coast, becoming increasingly arid towards the west coast and western areas of the country. The average rainfall per annum of 497 mm is far below the world average of 860 mm per annum.

On average, the climate is warm and dry with winter temperatures rarely falling below 0°C. In some areas, the summer maximum temperatures frequently rise above 35°C, with winter temperatures rarely falling below zero degrees. Its geographical position and features make the country very vulnerable to the whims of the El Nino and La Nino events. This is confirmed by the National Climate Change Response White Paper (2011:8), which indicates that South Africa is tremendously vulnerable and unprotected against the impact of climate change because of the country's socio-economic and environmental conditions. The National Climate Change Response White Paper (2011:5) further states that climate change is becoming a reality and developing countries, including South Africa, are vulnerable to the effects of this phenomenon (NCCR, 2011:5).

According to the National Climate Change Response White Paper (2011:8), the rise in the average global temperature is due to an increased concentration of greenhouse gases (GHGs) in the atmosphere. The National Climate Change Response White Paper (2011:8) further states that evidence of the increasing climate changes has been observed. The past decade was known as the hottest on record, due to rapid increases in average temperatures throughout the world. Other evidence of increasing climate changes includes the rises in the sea levels, increasing changes in average rainfall patterns, with some regions experiencing extreme weather events with heavy rainfalls and floods, whereas in other regions it is becoming much drier (NCCR, 2011:8).

The National Climate Change Response White Paper (2011:9) states that by 2100, the South African coastline will experience average temperature increases of around 2°C to 3°C and 6°C to 7°C in the interior. It is further predicted that within the next 50

years, the western areas of the country will become drier and that other areas will experience a shorter rainfall period with increasing temperatures in the interior.

Furthermore, the sea level could rise because of climate change. Because of climate change, the country could experience more intense and extreme weather events such as droughts and floods. The effect of climate change will significantly affect the agriculture sector, the lives and health of people, and other water-intensive economic sectors, including the mining, manufacturing and electricity-generation sectors as well as the ecosystem and the environment in South Africa (IFRC 2011:17-18; National Climate Change Response White Paper, 2011:8-9). Thus, the South African government has to put specific legislation, policies, strategic interventions and priorities in place to ensure and promote a coordinated, coherent, effective and efficient response to the challenges of climate changes in the country (IFRC 2011:17-18; NCCR, 2011:9).

The cloudburst and floods in Ekurhuleni (East Rand area in Johannesburg) on 09 November 2016, left almost 200 homes washed away in Alexandra, with thousands of motorists stranded and some washed away, planes delayed at OR Tambo International Airport and a boundary wall at Johannesburg Zoo washed away. This incident is a typical example of extreme weather events in the country, while other regions have been experiencing severe droughts since 2016. However, the above examples provide a clear indication of the lack of response, recovery and preparedness planning on the part of disaster risk management officials (Khoza, News 24, 09 November 2016).

According to Botha and Van Niekerk (2013:2), local communities are more vulnerable to disaster events. This is where smaller but the most frequent hazards occur, such as the above extreme weather events and where the costs in terms of loss of lives and infrastructure and financial burden are felt the most. The above discussion emphasises the fact that each local municipality has a different risk profile and each town or city faces a variety of different hazards and risks. Therefore, each municipality within the local sphere of government has a significant role to fulfil concerning Disaster Risk Management and risk reduction (Botha and Van Niekerk, 2013:2).

2.4 AN OVERVIEW OF RELATED MECHANISMS AND CONCEPTS OF DISASTER RISK MANAGEMENT

The next section will discuss some of the related mechanisms and concepts related to disaster risk management.

2.4.1 The Municipal Integrated Development Planning Process and Disaster Risk Management

According to Venter (in Van der Waldt *et al.,* 2007:103), integrated development planning refers to a participatory planning process aimed at the integration of municipal sectoral strategies to support the effective allocation of limited resources within a municipality. Venter (in Van der Waldt *et al.,* 2007:103) indicates that an integrated development plan refers to a process through which individual municipalities must obtain a five-year strategic development plan for the municipality. Section 25(1) of the MSA (2000) requires the municipal council, within a prescribed period after the start of its elected term, to adopt a single, inclusive and strategic plan for the development of the municipality, namely:

- To link, integrate and coordinate plans and take into consideration proposals for the development of the municipality;
- To align the resources and capacity of the municipality with the implementation of the plans;
- To form the policy framework and general basis on which annual budgets must be based; and
- To ensure that the national provincial development plans and planning requirements are binding on the municipality in terms of legislation.

Section 26 of the MSA (2000) further outlines the core components of the Integrated Development Plan (IDP) of a municipality to reflect the following:

- The municipal council's vision for the long-term development of the municipality with special emphasis on the municipality's most critical development and internal transformation needs;

- An assessment of the existing level of development in the municipality, which must include an identification of communities that do not have access to basic municipal services;
- The council's development priorities and objectives for its elected term, including its local economic development aims and its internal transformation needs;
- The council's development strategies, which must be aligned with any national or provincial sectoral plans and planning requirements binding on the municipality;
- The council's operational strategies;
- An applicable disaster management plan; and
- A financial plan, which must include a budget projection for at least the next three years.

Nealer (in Van der Waldt *et al.,* 2007:102) mentions that the Integrated Development Planning (IDP) process should be seen as a strategic management planning process that follows a logical sequential cycle, and a change in one phase of the planning process will affect the other phases. Each phase of the Integrated Development Planning (IDP) process has its own challenges that will influence the ultimate usefulness of the IDP in municipal service delivery. Van Niekerk (2006:110) maintains the disaster management must be integrated into all the phases of development planning. The Integrated Development Planning (IDP) methodology consists of five phases of the integration of Disaster Risk Management and each of these phases are discussed below.

2.4.1.1 Phase 1: The Situation Analysis phase

According to Venter (in Van der Waldt *et al.,* 2007:113), the analysis phase deals with the current situation within a specific municipal area. It involves an analysis of internal factors such as the internal processes and practices of the municipality, as well as an analysis of the external environments, which includes the political, economic, social, legal and technological factors that have an impact on the municipality. The outputs of the situation analysis phase include an assessment of existing level of development, identification of priority issues, information on the extent and nature of the causes of

priority issues and information on available resources to address these issues (LGSETA, IDP Skills Programme Workbook III, 2000: 44; IDP Guide Pack, 0, An Overview, 2000:17).

Van Niekerk (2006:111) argues that during the analysis phase, disaster management information should be obtained regarding which types of hazards are common in the area, the magnitude of disasters and their effects. A vulnerability assessment should also be conducted to identify the extent of the vulnerability of the environment in the municipal area. The municipality has to identify the communities who are at risk in the event of hazards or disasters. Van Niekerk (2006:111) further maintains that the municipality has to conduct a capacity assessment to identify how the municipality will be able to cope with a hazard or disaster.

2.4.1.2 Phase 2: Strategy phase

Once a municipality has a clear understanding of its challenges and priority issues, it must formulate the solutions to address these challenges. During the strategy phase, the municipality has to formulate the following:

- **Vision**. The vision can be seen as a statement that indicates the ideal situation the municipality would like to achieve in the long term, once it has addressed the challenges as identified during the first phase of the Integrated Development Planning (IDP) process (IDP Guide Pack, 0, An Overview, 2000:17).
- **Development objectives**. The priority issues identified during the first phase need to be translated into quantifiable and achievable objectives. IDP Guide Pack, 0, An Overview (2000:17) maintains that development objectives are statements that refer to what the municipality would like to achieve in the medium term in order to address the challenges as well as to realise the vision statement of the municipality. The MFA, Circular 13 as cited in LGSETA, IDP Skills Programme Workbook III (2000:72) also requires that these strategic objectives identified during Phase 2 must be integrated into service delivery targets in the Service Delivery and Budget Implementation Plan (SDBIP).
- **Development strategies**. Once the municipality has identified its development objectives, it must then develop its development strategies as the most appropriate

way and means to achieve the set objectives (Venter, in Van der Waldt *et al.,* 2007:113).

- **Project identification**. As soon as the municipality has formulated its strategies, the municipality has to identify a list of projects. Once projects are listed, a financial and resource discussion should follow to fund the required projects. Without funding possibilities, the strategy becomes problematic and the municipality has to discuss alternatives (LGSETA, IDP Skills Programme Workbook III, 2000:78).

During the strategies phase, the municipality has to formulate specific disaster-management strategies that focus on prevention strategies, vulnerability reduction strategies, contingency plans, a risk reduction strategy, a disaster response strategy and strategies to improve the municipality's capacity to deal with hazards or disasters. These strategies should be integrated into the municipality's integrated development plan and specific projects that will be identified during the next phase (Van Niekerk, 2006:110-113).

2.4.1.3 Phase 3: Project phase

During this phase, the municipality deals with the design and specification of projects for implementation. IDP Guide Pack, 0, An Overview (2000:17) holds that the municipality must ensure that the identified projects are aligned with the priority issues and the strategic objectives that were identified during the first phase. During this phase, the target group, as the beneficiary of the projects, the location of the project, and the timeframes of the project, the role clarification, and the resources needed, as well as the people who will fund the projects and the specific indicators to measure the performance of the projects need to be clarified. The output of this phase includes performance indicators, project outputs, targets and the location, the project details and timeframes, and the cost and budget estimates (Nealer, in Van der Waldt *et al.,* 2007:104; IDP Guide Pack, 0, An Overview, 2000:17-18). During this phase, it is imperative to assess all projects such as infrastructure projects according to the disaster risk they pose. Specific Disaster Risk Management projects such as the establishment of a Disaster Management Centre or a livelihoods analysis should be identified during the project phase (Van Niekerk, 2006:112).

2.4.1.4 Phase 4: Integration phase

During this phase, the municipality has to ensure that the projects are in line with the municipality's objectives, strategies, resource frameworks, and that it complies with legal requirements (LGSETA, IDP Skills Programme Workbook III, 2000:96). The municipality has to consolidate its operation strategies, which include the following:

- Integrated Sector Programmes that include the Integrated Local Economic Development Programme (LED), poverty alleviation, an Integrated HIV/AIDS programme and an integrated environmental program
- An integrated institutional plan
- A five-year financial plan
- A five-year capital investment programme
- An Integrated Spatial Development Framework
- A consolidated monitoring and performance management system
- Disaster Risk Management plan

(LGSETA, IDP Skills Programme Workbook III, 2000:96).

During the Integration Phase, the municipality has to compile a Disaster Risk Management plan. In terms of the DMA (2002), a Disaster Risk Management plan should include the following: a risk profile of the municipality, a risk reduction strategy, a disaster response strategy, emergency preparedness, and a disaster management information system. The Disaster Risk Unit of the municipality has to provide input related to other relevant plans such as financial implications of the Disaster Management Plan, spatial indication of the specific communities that are at risk, performance management indicators and inputs relating to the establishment of a Disaster Management Centre (Van Niekerk, 2006:113).

2.4.1.5 Phase 5: Approval phase

During this phase, the municipality has to submit its Integrated Development Plan (IDP) to the municipal council for consideration and approval. Before the council's approval of the municipality's Integrated Development Plan (IDP), the municipality must give the public an opportunity to comment on the draft IDP. Once the municipality amends the draft Integrated Development Plan (IDP) in accordance with the input from

the public, the council should consider the IDP for approval (IDP Guide Pack, 0, An Overview, (2000:19). Section 3: Key Performance Area 3, Sub-Section 3.4 of the Disaster Management Framework (2005:104) provides for the inclusion of efforts in other structures and processes and that the following bodies have to adopt the disaster management plan.

Once a municipality has adopted its Integrated Development Plan (IDP), the Member of Executive Council (MEC) of the Province has to assess that the IDP complies with the requirements of the *Municipal System Act, 2000* and that the municipality's IDP is not in conflict with the IDPs and strategies of other municipalities and organs of state (IDP Guide Pack, 0, An Overview, 2000:19). The Integrated Development Plan (IDP) of a municipality cannot be implemented without the necessary resources and funding available. In the next section, the Integrated Development Plan (IDP) and municipal budgets are discussed.

In terms of the Municipal Finance Management Act (2003) (Act 56 of 2003) (hereinafter referred to the as MFMA, 2003), all municipalities are mandated to develop a Service Delivery Budget Implementation Plan (SDBIP) which is an integral part of the financial planning process which incorporates the Integrated Development Plan (IDP) and the budget for a specific year. The Service Delivery Budget Implementation Plan (SDBIP) is a detailed plan approved by the Executive Mayor or Executive Committee for implementing the Municipality's Integrated Development Plan (IDP) and its related annual budget (Mangaung Metropolitan Municipality's Annual Performance Report 2011/2012, 2012:41).

2.4.2 An overview of related concepts of Disaster Risk Management

Although the related concepts were defined in Chapter 1 of this study, a good starting point is to outline some key related concepts and mechanisms relating to Disaster Risk Management. The purpose is to gain a common understanding of the tenets of Disaster Risk Management in the South Africa.

2.4.2.1 Disaster Risk Management

In the international arena, the term *Disaster Risk Management* is widely preferred, compared to “disaster management” as a concept. According to Vermaak and Van Niekerk (2004:558), the increasing number of disasters necessitates an approach that moves beyond pure “disaster management” that would include Disaster Risk Management and disaster risk reduction. Both these approaches would include conducting disaster risk assessment before developing mitigation and prevention strategies.

According to Coburn *et al.* (in Van der Waldt *et al.,* 2007:257), Disaster Risk Management refers to all aspects of planning, and responding to disaster activities pre-and-post the actual event. Van Niekerk (in Van der Waldt *et al.,* 2007:257) further affirms that the South African definition, as cited in the DMA (2002), focuses on the multisectoral and multidisciplinary approach (DMA 57 of 2002).

The DMA (2002) explains that Disaster Risk Management is a continuous, integrated, multisectoral, multidisciplinary process of planning and implementation of measures to:

- Prevent or reduce the risk of disasters;
- Mitigate the severity or impact of disasters;
- Plan for emergency preparedness; rapid and effective response to disasters; and
- Make provision for post-disaster recovery and rehabilitation measures.

In addition, the NDMF (2005:228) identifies the term *Disaster Risk Management* as an all-encompassing definition referred to in the DMA (2002).

Vermaak and Van Niekerk (2004:556-557) further argue that disaster risk reduction is an underlying tenet of Disaster Risk Management in its definition, as provided for by the DMA (2002). This demonstrates that the definition places emphasis on the implementation of measures to reduce risks, which indicates that it encompasses Disaster Risk Management. For this reason, the NDMF (2005:2) proposes the use of the term *Disaster Risk Management*.

According to the United Nations International Strategy for Disaster Reduction (UNISDR) (2009:10), Disaster Risk Management refers to the structural and non-structural measures undertaken to prepare for, to mitigate against, and or prevent the negative influences of disasters. The UNISDR (2009:10) states that Disaster Risk Management refers to all the programmes, projects, measures and instruments aimed at reducing disaster risk in endangered areas and mitigating the extent of disasters. Thus, Disaster Risk Management includes risk assessment, disaster prevention, mitigation and disaster preparedness (UNISDR, 2009:10).

Van Niekerk (in Van der Waldt, 2007:256) avers that Disaster Risk Management is a more tactical and operational expression of strategic decisions. It is aimed at addressing disaster risk problems in accordance with the resources and constraints enacted by the strategic focus of disaster risk reduction at both tactical and operational levels. Furthermore, Vermaak and Van Niekerk (2004:556-557) further argue that disaster risk reduction is an underlying tenet of Disaster Risk Management (Vermaak and Van Niekerk, 2004:556-557).

However, for the purpose of this study, the term and definition of Disaster Risk Management as defined in the NDMF (2005) were used, as it is also consistent with the use of the definition in the international arena. Another facet of Disaster Risk Management is the concept of disaster risk reduction that are discussed in the next section.

2.4.2.2 Disaster Risk Reduction

The NDMF (2005:228-229) indicates that disaster risk reduction refers to the elements considered with the possibility of minimising vulnerabilities and disaster risks throughout a society. These elements include disaster risk-reduction principles of prevention, mitigation and preparedness strategies, which are required to minimise vulnerabilities throughout society. It also refers to the measures instituted to avoid (prevention) or to limit (mitigate and prepare) the adverse effects of hazards within the broader context of sustainable development.

Vermaak and Van Niekerk (2004:556) maintain that disaster risk reduction requires the development and application of specific technical skills and abilities to minimise

vulnerabilities and disaster risks within a specific region or community. Vermaak and Van Niekerk (2004:558) further argue that disaster risk reduction has a clear focus on the characteristics and impacts of hazards and vulnerability with regard to social, political, economic and environmental factors.

Disaster risk reduction encompasses risk and vulnerability assessment of critical social and economic infrastructure and early warning systems (DMA, 2002). Moreover, disaster risk reduction requires a multidisciplinary approach for effectiveness. Therefore, all spheres of government have a specific responsibility to develop and apply policies, strategies and practices in such a manner that it assesses and minimises disaster risks. In terms of the *Disaster Management Amendment Act, 2015* disaster risk reduction refers to a policy objective and the strategic and instrumental measures to be able to anticipate future disaster risks, to reduce existing exposure, hazards or vulnerability, and to improve resilience. For the purpose of this study, the latter definition are used in the study.

According to Madubula and Van Niekerk (2013:16), disaster risk reduction can be defined as the exercise of reducing disaster risks through methodical efforts to analyse and manage the underlying factors of disasters, including through reduced experience of hazards, reduced vulnerability of people and property, effective management of land and the environment. It also involved the preparedness for adversarial events. According to Van Niekerk (in Van der Waldt, 2007:255), “risk reduction” and “disaster risk reduction” have drawn some discussion over the past decade. It is argued by Jeggle (in Van der Waldt, 2007:255), that both concepts refer to the same phenomenon. The term “disaster risk reduction” is more widely used. Disaster risk reduction focuses more on what is being reduced in comparison with “disaster reduction” that gives the impression that the main focus of disaster (risk) reduction is disaster, rather than hazards and conditions of vulnerability.

Vermaak and Van Niekerk (2004:556) state that disaster, risk reduction reflects a new global approach to the management of disasters. The United Nations International Strategy for Disaster Reduction (UNISDR) (2002:25) distinguishes disaster risk reduction as the “systematic development and application of strategies, legislation, policies and practices in order to minimise vulnerabilities and disaster risks, throughout a specific society”. The purpose of disaster risk reduction is to avoid (prevent) or to

limit (mitigate and prepare) the adverse effects of hazards within the broader context of sustainable development.

On the other hand, the World Bank (2004:4) defines disaster risk reduction as the process of avoiding hazards and reducing vulnerability. The NDMF (2005:228-229) indicates that disaster risk reduction refers to the elements considered with the possibilities of minimising vulnerabilities and disaster risks throughout a society. These elements include disaster risk-reduction principles of prevention, mitigation and preparedness strategies, which are required to minimise vulnerabilities throughout society. It also refers to the measures instituted to avoid (prevention) or to limit (mitigate and prepare) for the adverse effects of hazards within the broader context of sustainable development.

Vermaak and Van Niekerk (2004:556) maintain that disaster risk reduction requires the development and application of specific technical skills and abilities, to minimise vulnerabilities and disaster risks within a specific region or community. Vermaak and Van Niekerk (2004:558) further argue that disaster risk reduction has a clear focus on the characteristics and impacts of hazards and vulnerability with regard to social, political, economic and environmental factors.

Disaster risk reduction encompasses risk and vulnerability assessment of critical social and economic infrastructure and early warning systems (DMA, 57 of 2002). Moreover, disaster risk reduction requires a multidisciplinary approach for effectiveness. Therefore, all spheres of government have a specific responsibility to develop and apply policies, strategies and practices in such a manner that it assesses, and minimises disaster risks. In terms of the Disaster Management Amendment Act, 2015, disaster risk reduction refers to a policy objective and the strategic and instrumental measures to be able to anticipate future disaster risks, to reduce existing exposure, hazards or vulnerability and to improve resilience. For the purpose of this study, the latter definition are used in the study.

2.4.2.3 Disaster Response and Recovery

According to Madubula and Van Niekerk (2013:166), disaster response refers to the provision of emergency services and public assistance during or directly after a

disaster with the aim to save lives, and to reduce the impact of the disaster as well as to ensure the safety of people and to meet the basic subsistence needs of those affected by the event. Ghesquiere and Mahul (in Madubula and Van Niekerk, 2013:166) define recovery as

> the restoration and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including the efforts to reduce disaster risk factors.

Additionally, Madubula and Van Niekerk (2013:166-167) cite that several techniques can be applied to approximate the likely cost of early recovery operations. One of the techniques include that catastrophic risk models can be used to simulate the impact on the infrastructure of natural disasters. A catastrophic risk model can be used to provide a rough estimate of the lifeline infrastructural requirements, including water, transportation and electricity that in general will be damaged in the event such as an earthquake disaster.

Madubula and Van Niekerk (2013:167) further explain that these types of models can be used to indicate the number of building that needs to be rebuilt. It could also give an indication of the estimated number of people who would likely be left homeless and who need assistance during such a disaster. A concern is that in the case of such a natural disaster, municipal authorities generally do not have the capacity or the assets to face the obligations in such an event. The three phases of disaster response and recovery, namely to provide relief, to carry out recovery works and to complete reconstruction operations will also be affected by the capacity of the government authority. Furthermore, scenario analysis and risk models can assist government authorities in understanding the immediate needs that are required directly after a catastrophic disaster.

2.4.2.4 Disaster Risk Assessment

The United Nations International Strategy for Disaster Reduction (UNISDR) (2002:25-27) defines disaster risk assessment as the process used to determine the nature and extent of risk, by analysing the potential hazards. It also entails the evaluation of current conditions of vulnerability that could be a potential threat to the environment,

the people or property in a specific area. According to the NDMF (2005:235), disaster risk assessment includes hazard identification, vulnerability analysis, capacity analysis, risk evaluation and risk analysis.

The NDMF (2005:235) affirms that disaster risk assessment is the first step in planning for an effective disaster risk-reduction programme. This includes examining the likelihood and the expected outcomes of disaster risks. For this reason, disaster risk assessment should include an investigation of hazards and conditions of vulnerability, which may increase the likelihood of loss. According to the NDMF (2005:51-68), disaster risk assessment requires an effective monitoring and evaluation system to:

- Promote effective Disaster Risk Management and risk reduction planning;
- Promote sustainable development planning;
- Identify potential threat;
- Identify disaster risk reduction programmes for specific threats;
- Identify high-risks periods and conditions; and
- To activate preparedness and response actions.

The NDMF (2005:45-52) further provides that all relevant organs of state, the three spheres of government and the private sector must conduct disaster risk assessments. In doing so, these institutions must identify and prioritise disaster risks, which are relevant to their functional areas:

- Prior to the implementation of any national disaster risk reduction, preparedness or recovery programme;
- In the planning phase for large-scale housing, infrastructure or commercial industrial developments of national significance, that may affect the natural environment; and
- In the case of social, economic, infrastructural, environmental, climatic or other indicators that suggest changing patterns of risk which may increase the likelihood of nationally significant disaster impacts.

Vermaak and Van Niekerk (2004:558-559) state that the first step in disaster risk reduction is the assessment of possible hazards that could have an impact on a specific community.

2.4.2.5 Disaster Risk Mitigation

According to the DMA (2002), “mitigation” in the context of Disaster Risk Management, refers to measures or actions taken to reduce the impact or effects of disasters. Section 20 of the DMA (2002) illustrates that the National Disaster Management Centre must support organs of state, the private sector, non-governmental organisations, communities and individuals to assess and prevent or reduce the risk of disasters. The DMA (2002) further proposes that the National Disaster Management Centre must promote formal and informal initiatives that encourage risk-avoidance behaviour by all Disaster Risk Management stakeholders. For this reason, the NDMF (2005) has been developed to assist disaster management institutions and practitioners in planning and preparing for their own set of mitigation measures in the event of a disaster.

The NDMF (2005:231) defines disaster risk mitigation as the structural and non-structural measures undertaken to limit the adverse effects of natural hazards, environmental degradation and technological hazards in vulnerable areas, communities and households. This definition of mitigation, as embraced by the NDMF (2005), is a narrower version of the definition provided by the DMA (2002). The definition, as espoused by the NDMF (2005:2231), seeks to give more impetus to what the practitioners ought to do, in their planning and preparation of their disaster mitigating measures. Furthermore, The United Nations Office for Disaster Risk Reduction (UNISDR) defines mitigation as “the lessening or limitation of the adverse effects of hazards and related disasters” (UNISDR – UN Office for DRR, 2009:10). The negative impacts of disasters cannot be prevented; however, the severity and/or intensity of disasters may be greatly reduced if effective disaster risk systems are in place. Renewed engineering techniques are examples of mitigation measures that could be used to withstand the impact of disasters. For instance, the use of hazard-resistant materials in the construction of homes, bridges, dam walls and other infrastructure developments are some examples of renewed engineering techniques. In order to prevent large-scale infrastructure losses and lives, renewed engineering techniques are an important consideration, especially in densely populated areas (UNISDR, 2009).

The *Disaster Management Amendment Act, 2015* provides that a mitigation in relation to a disaster or a disaster risk refers to the decreasing the likely adverse impacts of physical hazards, human- induced hazards my means of actions that reduce hazards, their exposure and vulnerability. Mitigation in relation to climate change refers to human interventions to reduce the sources of greenhouse gases.

2.4.2.6 Vulnerability and Vulnerability Assessments

The DMA (2002) states that vulnerability refers to the degree to which an individual or a community or even a household may be unfavourably affected by a disaster, while the *Disaster Management Amendment Act, 2015* states that vulnerability refers to those conditions determined by the physical, social, economic and environmental factors that contribute to an increase in the susceptibility of a community to the impacts of hazards and disaster events. Vermaak and Van Niekerk (2004:561) maintain that the DMA (2002) provides that annual vulnerability assessments are required.

Furthermore, provincial and local governments have to provide feedback on an annual basis on a variety of aspects. Vermaak and Van Niekerk (2004:561) are of the opinion that the following mechanisms fulfil an important role concerning vulnerability and vulnerability assessments:

- **Social Development Poverty Alleviation Programme.** The Department of Social Development fulfil an important role in the identification of vulnerable communities through its social development poverty alleviation programme across different provinces.
- **National Disaster Vulnerability Atlas**. The National Disaster Management Centre make use of the National Disaster Vulnerability Atlas, an integrated web-enabled, database-driven, vulnerability and risk assessment management system that enables all departments to capture data concerning vulnerabilities on this system. The system assists users in having access to maps, images, graphs and charts relating to various hazards, potential disastrous scenarios and risks (Vermaak and Van Niekerk, 2004:561).
- **Disaster Mitigation for Sustainable Livelihood Programme (DiMP)**. According to Vermaak and Van Niekerk (2004:562) the University of Cape Town's Disaster Mitigation for Sustainable Livelihood Programme (DiMP) has

a disaster risk information system that is used to identify trends and vulnerabilities as well as to track disaster events within the Cape Town Metropolitan region.

- **Disaster Risk Management (DRM) Software Package**. The Disaster Risk Management Software Package was developed by the African Centre for Disaster Studies at the North-West University, in collaboration with a software company to assess a wide variety of hazards and vulnerabilities. The Disaster Risk Management Software Package makes use of specific formulae and scales to rank and measure hazards and vulnerability. Furthermore, the Disaster Risk Management Software Package can be used to view all settlements within fire-prone areas. It further allows users to have access to various different templates and reports such as disaster management plans to assist users with their planning process (Vermaak and Van Niekerk, 2004:562).
- **Council for Scientific and Industrial Research (CSIR), Environmentek.** The Council for Scientific and Industrial Research (CSIR), Environmentek provides the necessary technologies that are used for environmental assessments and management and a variety of other aspects such as water-resource management.
- **Safari2000**. This is an international regional science initiative that was developed for Southern Africa in collaboration of various national and international role-players with the intention to explore and addresses the nexus between land-atmospheric processed, pyrogenic emissions and their impact on the biogeochemical systems of Southern Africa (Vermaak and Van Niekerk, 2004:561).

2.4.2.7 Climate Change

According to Wisner *et al.* (2012:207), climate change can be caused by both natural processes and by means of human activity. Wisner *et al.* (2012:207) further indicate that a broader concept, namely global environmental change includes the build-up of greenhouse gases in the atmosphere that leads to an increase in mean atmospheric temperatures that contributes to changes in rainfall patterns and in prevailing climates around the world. The definition of global environmental change also refers to other changes in the biosphere such as the rise of sea levels, land-use and land-cover

change that reflects the impact of human activities. In terms of the *Disaster Management Amendment Act, 2015*, climate change refers to a change in the state of the climate that is identified by changes in the variability of its properties that continue for a specific period, preferably decades or even longer (Wisner *et al.,* 2012:207).

Climate Change is posing a serious threat to sustainable development and poverty alleviation in South Africa. Because of its vulnerability to the impact of global warming and consequently climate change, the South African Government, using the Department of Environmental Affairs and Tourism, has developed a Climate Change adaptation strategy. These strategies are intended to minimise the impact of disaster management using the DMA (2002) and the NDMF (2005) (NDMC Annual Report 2015:8).

2.5 NATIONAL STATUTORY AND REGULATORY FRAMEWORKS CONCERNING DISASTER RISK MANAGEMENT AND DISASTER RISK REDUCTION

According to the IFRC (2010:25), has South Africa developed a range of statutory and regulatory frameworks and policies relevant to Disaster Risk Management and risk reduction after 1994 with the establishment of a Constitutional democracy in the country. The legislative frameworks relating to disaster management risk reduction includes the three spheres of government. The first set of legislative frameworks and policies makes provision for disaster management as a broad functional are while certain statues and legislative frameworks deals with certain types of disasters such as crowd control, fires, mining accidents, environmental issues, land-use planning, water resources, building and construction that have specific provisions concerning disaster management, risk reduction, response and rehabilitation.

The next section discusses the various legislative frameworks that relate to DRM in South Africa such as the *Constitution*, 1996 and other legislation.

2.5.1 The Constitution of the Republic of South Africa, 1996

The *Constitution of the Republic of South Africa, 1996* (hereinafter referred to as the *Constitution, (1996),* pronounces a number of fundamental rights that binds the legislature, the executive and the judiciary, branches of government and all organs of

state. In terms of Section 11 of the Bill of Rights provided in Chapter 2 of the *Constitution*, *1996* all people have the right to life, while Section 10 states that everyone has inherent dignity, and the right to have their dignity respected and protected. Section 24(a) provides that everyone has the right to an environment that is not harmful to his or her health or wellbeing. Section 24(b) of the *Constitution*, *1996* provides that everyone has the right to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures to prevent pollution and ecological degradation; to promote conservation; and to secure ecologically sustainable development and the use of natural resources (RSA, 1996).

According to the IFRC (2010:25), the *Constitution*, *1996* makes provision for the separation of powers amongst the legislative, executive and judicial branches of the three spheres of government. Furthermore, Section 24(b) of the *Constitution*, *1996* provides that national laws are made by Parliament and executed by Members of Cabinet. Section 125 *of Constitution*, *1996* states that the executive authority of a province is vested in the Premier, together with other Members of the Executive Council for implementing national and provincial legislation in that province. In terms of local government, Section 151(2) of the *Constitution*, *1996* provides that the executive and legislative authority of a municipality be vested in its municipal council.

Thornhill (2014:44) avers that Section 40(1) of the *Constitution*, *1996* provides that the three spheres of government, national, provincial and local spheres of government are distinctive, interdependent and interrelated. In spite of the three spheres independence, Section 41 of the *Constitution*, *1996* provides for the principle of cooperative government and intergovernmental relations that requires that all spheres of government and all organs of state within each sphere must secure the well-being of the people of the Republic of South Africa. Section 41(h) of the *Constitution*, *1996* provides for the three spheres of government to cooperate with one another in mutual trust and good faith by fostering friendly relations, assisting and supporting one another, informing one another on matters of mutual interest and coordinating their actions and legislation with one another, as well as to adhere to agreed procedures.

In terms of Section 152 of the *Constitution*, *1996*, local government is responsible for the following objectives:

- The provision of a democratic and accountable government for the community in the municipal area;
- The provision of services in a sustainable manner to the community within its area;
- To promote social and economic development within the municipal area;
- To promote a safe and a healthy environment for its community; and
- To encourage community participation of communities and community organisations in the matters of the municipality.

According to Van der Waldt *et al.* (2014:45), the *Constitution*, *1996* stipulates that municipalities are responsible for delivering services to its community to satisfy their basic needs. Section 155(1) of the *Constitution*, *1996* makes provision for the different categories (Category A, B and C) municipalities. In terms of Part A, Schedule 4 of the *Constitution*, *1996*, Disaster Risk Management is one of the concurrent functional areas of national and provincial legislative competence. It means that disaster management is not a local government matter. Although Part A of Schedule 4 of the *Constitution*, *1996* absolves local governments from Disaster Risk Management functions, cognisance must be taken of the fact that local governments are closest to the people and that the communities are the first respondents to disasters. However, Section 156(4) (a) of the *Constitution*, *1996* provides for national and provincial government to assign the administration of a matter listed in Part A of either Schedules 4 or 5 to a municipality if the matter would most effectively be administered at local sphere.

Consequently, Part A of Schedule 4 of the *Constitution*, *1996* should be understood, together with Section 156(4) of Chapter 7 of the *Constitution*, 1996, which provides that the national and provincial spheres of government must assign DRM responsibilities to a municipality, by agreement. Furthermore, subject to any conditions, the administration of a matter listed in Part A of Schedule 4 or Part A of Schedule 5, which necessarily relates to local government.

Van Niekerk (in Van der Waldt *et al.,* 2014:267) avers that in terms of Part 4 and 5 of the *Constitution*, *1996*, local government is required to perform the functions such as air pollution, building relations, fire-fighting services, municipal integrated development

planning, municipal healthcare services, water and sanitation services that are related to disaster management. The above discussion demonstrates that Disaster Risk Management is the functional competence of all spheres of government including the local sphere of government. However, it must also be noted, that some municipalities may not have the administrative and management capacity to offer effective Disaster Risk Management services. In instances where municipalities do not have the necessary competence or the capacity to render effective Disaster Risk Management services, assistance could be sought from other spheres of government.

According to Van Niekerk (in Van der Waldt, 2014:267), the national and provincial governments are legally obliged to ensure that Disaster Risk Management is implemented according to the legislative requirements, as required in terms of the Schedule 4 of the *Constitution, 1996* and in accordance with the DMA (2002). As stated above, local governments should not be exempted from Disaster Risk Management services if they have the capacity to do so, since all local governments have an important role to fulfil regarding the management of Disaster Risks.

2.5.2 The Disaster Management Act 57 of 2002 and the Disaster Management Amendment Act 16 of 2015

The main purpose of the DMA (2002), as stated in Chapter 3 Part 1:9, is to provide for an integrated and coordinated disaster management policy focusing on the prevention and or reduction of risks, associated with the disasters. The IFRC (IFRC) and Red Crescent Societies (RCS) (2010:26) state that the Disaster Management Framework (2005) makes provision for an institutional framework for disaster management. It further provides a policy and strategic planning framework for disaster management, the classification of disaster, and it makes provision for funding of post-disaster recovery and rehabilitation matters.

In this regard, various structures and institutions such as the national, provincial and municipal Disaster Management Centres have been established to provide for a well-coordinated and integrated Disaster Risk Management as stated above. The purpose of these centres is to promote an integrated and coordinated system of Disaster Risk Management, with specific emphasis on prevention and mitigation of Disaster Risk Management in South Africa. Section 42 and 43 of the DMA (2002) provides that each

district and metropolitan municipality must establish a Municipal Disaster Management Framework and a Disaster Management Centre. Part 3, Section 51(I) of the DMA (2002) provides for a municipality to establish a Municipal Disaster Management Advisory Forum (MDMAF) and a municipal Interdepartmental Disaster Management Committee (IDMC) (Chapter 1, Section 7d, e, and f). The Municipal Disaster Risk Management Centre must act as a repository of information concerning disasters, impending disasters and Disaster Risk Management. In addition, the Municipal Disaster Risk Management Centre should act as an advisory and consultative body on issues concerning disasters and Disaster Risk Management to schools, vulnerable communities and other stakeholders. In terms of Section 48(I)(a) (I, ii and iii) of the DMA (2002), these Disaster Risk Management Centres must also monitor the prevention, mitigation and response initiatives by all organs of state, the private sector and non-governmental organisations in the municipal area. It is imperative that these initiatives be included in the integrated development plans (IDP) of the municipalities.

The DMA (2002) further claims in Section 19(a-f) that each municipality (metropolitan, district and local municipality), must develop a Disaster Risk Management (DRM) plan. Section 7(2)(e) indicates that a copy of the Disaster Risk Management plan must be submitted to the applicable provincial and national Disaster Risk Management Centres. On receipt of the risk management plans, the Disaster Risk Management Centres may then make recommendations regarding the funding thereof, in line with all relevant municipal legislation.

According to DPLG (2008:6), the DMA (2002) places a statutory responsibility concerning Disaster Risk Management and risk reduction on every organ of state in each of the three spheres of government and it gives the mandate for the establishment of Disaster Risk Management Centres in all three spheres of government. The DMA (2002) further requires cooperation and collaboration from all role-players on the part of national, provincial and local spheres of government, civil society and the private sector (DPLG, 2008:6).

According to the IFRC and RCS (2010:31), the DMA (2002) makes provision for the classification and the declaration of disasters at a national sphere in Section 27, while Section 41 deals with provincial sphere and Section 55 deals with the classification and the declaration of disasters at local sphere. IFRC and Red Crescent Societies

(2010:31) further provide that Section 23(4) of the DMA make provision for the determination, whether a disaster qualifies as a national, provincial or local disaster. Therefore, one could argue that a disaster can be declared a local disaster if it affects a specific metropolitan, distract or a specific local municipality. In the case of a local municipality, it must deal with a disaster with the assistance of the district municipality to deal effectively with the disaster.

Because of certain shortcomings of the DMA (2002), the *Disaster Management Amendment Act 16 of 2015* was published in December 2015. As such, the *Disaster Management Amendment Act, 2015* includes additional disaster management-related definitions. It also makes provision for the alignment of the functions of the NDMAF to accommodate the South African National Platform for disaster risk reduction. Section 16(3) of the *Disaster Management Amendment Act 16 of 2015* states that a local municipality must establish capacity for the development and implementation of its disaster management function and disaster management plan. Section 16(4) of the *Disaster Management Amendment Act, 2015* further makes provision for the establishment of a Disaster Management Centre within a local municipality in consultation with the relevant district municipality (*Disaster Management Amendment Act 16 of 2015*).

Section 7 of the *Disaster Management Amendment Act, 2015* further provides for the South African National Defence Force, the South African Police Service and other organs of state to assist the disaster management structures. Section 10 makes provision for an extended reporting system by organs of state regarding information about the occurrences that lead to the declaration of disasters, including expenditure that could occur concerning response and recovery and any actions about risk reduction and related actions. Section 2 of the *Disaster Management Amendment Act, 2015* aims to strengthen the representation of traditional leaders in the advisory forums of all three spheres of government. Section 15 of the *Disaster Management Amendment Act, 2015* makes provision for disaster risk assessments for functional areas as well as to map risks areas and communities that are vulnerable to disaster events in the disaster management plans of applicable disaster management structures. It also makes provision for suitable measures to reduce risks of disaster through adaptation to climate change and to develop early warning mechanisms.

Section 22 of the *Disaster Management Amendment Act, 2015* makes provision for specific regulations concerning disaster management education, training and research related aspects including the classifications of disasters (*Disaster Management Amendment Act 16 of 2015*).

In addition, the *Disaster Management Amendment Act*, *2015* provides that when a disastrous event occurs or threatens to occur, the National Centre for Disaster Management has to inform the relevant Provincial Disaster Management Centre of the decision on the classification of the disaster made. The *Disaster Management Amendment Act, 2015* further provides the following amendments, namely that a disaster is a provincial disaster if it affects more than one metropolitan or district municipality in the same province or a single metropolitan or district municipality in the province. It has to assist the metropolitan municipality or the district municipality with the assistance of the local municipalities within its area if they are unable to deal with the disaster effectively. The *Disaster Management Amendment Act, 2015* also makes provision that each organ of state must, on any occurrence leading to the declaration of a disaster report to the National Disaster Management Centre regarding the following on a quarterly basis:

- To provide information regarding the type, severity, loss in terms of lives, any damage to property, crops and any other goods;
- To provide information about the spatial attributes of the area, concerning the communities, or households that were affected by the disaster;
- To conduct an analysis of the impact of the disaster related to issues such as gender, age, disability and cultural perspectives;
- To provide information about the various measures that were implemented to restore communicates and about the reconstruction and rehabilitation of infrastructure in such a manner that make those communities less vulnerable to disaster as well as to strengthens their resilience;
- To provide information concerning any expenditure as a result of any response and post-disaster recovery and rehabilitation;
- To list any actions regarding risk reduction;
- To identify particular problems that were perceived while dealing with the disaster; and

- To provide any other information that may be prescribed.

In terms of the *Disaster Management Amendment Act, 2015,* each province and each provincial organ of state must conduct a disaster risk assessment for its functional area and to identify and map the risks, the areas, the communities and households and ecosystems that are exposed or be vulnerable to any physical or any human-induced threats. An important amendment for the purpose of this study is provided in Section 16(3) and (4) of the *Disaster Management Amendment Act, 2015*. In terms of Section 16(30), a local municipality must establish the necessary capacity for the development and coordination of a disaster management plan, including the implementation of its disaster management function for the municipality, which must form part of the disaster management plan of the municipality. It must also be approved by the relevant municipal Disaster Management Centre. Section 16(4) clearly provides that a local municipality may establish a Disaster Management Centre through consultation with the relevant district municipality, in accordance with the terms set out in a service-level agreement and in accordance with national norms and standards. This means that a local municipality, if it has the capacity, may develop its own Disaster Management centre and may develop and implement its own disaster management plan as approved by the particular district municipality (*Disaster Management Amendment Act 16 of 2015*).

The *Disaster Management Amendment Act, 2015* further makes provision in Section 21 that each municipality must conduct a disaster risk assessment for its municipality by identify and map the risk, the areas, the ecosystems, including the communities and households that are exposed or that are vulnerable to physical and human-induced threats. Thus, Disaster Risk Management is an integral part of metropolitan, district and local municipalities' integrated development planning activities.

2.5.3 National Disaster Management Framework, 2005 (NDMF)

The NDMF (2005) was designed to assist municipalities in developing their own coherent, transparent and inclusive policies and plans on Disaster Risk Management in South Africa. This framework, which serves as a guiding tool for effective Disaster Risk Management, focuses on the following four key performance areas:

The first key performance area of the NDMF (2005:6) focuses on the establishment of integrated institutional capacity within the national sphere of government to enable the effective implementation of Disaster Risk Management policies and legislation (NDMF2005:6). In this regard, the Intergovernmental Committee on Disaster (risk) Management (ICDM) was established. This committee is represented by a wide range of government officials from national and provincial government departments, politicians, the private and business sector, and community members. The main purpose of this committee is to ensure that policies and systems are in place for the rendering of effective Disaster Risk Management services to the South African population.

The second key performance area is to establish a uniform approach to assessing and monitoring disaster risks in South Africa. The purpose of this key performance area is to guide the three spheres of government and other role-players to develop and implement their own Disaster Risk Management and risk reduction strategies NDMF (2005:51-79). Therefore, this study will develop a Disaster Risk Management model and, in doing so, will outline the requirements for implementing and monitoring effective disaster risk reduction strategies.

The third key performance area strives to ensure that all relevant role-players develop and implement integrated Disaster Risk Management plans according to approved legislation. It sets out the parameters for the alignment of Disaster Risk Management framework and plans amongst the three spheres of government (NDMF, 2005:79-110).

Lastly, key performance area four provides for the implementation of an effective, integrated and coordinated rapid response, recovery and rehabilitation plans within all spheres of government (NDMF 2005:111-129). It also describes measures to ensure effective disaster response; recovery and rehabilitation planning is implemented across the three spheres of government. It must be noted that the NDMF (2005) is a guiding tool developed to assist disaster management practitioners, prevents the loss of lives and reduces poverty levels.

The NDMF (2005:111-129) provides policy guidelines to provinces for the development of provincial disaster management frameworks in compliance with the

DMA (2002). To synchronise all Disaster Risk Management plans within a specific province, metropolitan and district municipalities within a specific province are required, in terms of the DMA (2002), to develop their Disaster Risk Management Framework within the realm of the provincial frameworks. Therefore, each organ of state is required to develop its disaster management plan, taking into consideration specific disaster risks that may present itself within its jurisdiction.

The NDMF (2005) further provides strategic policy direction for the development of Disaster Risk Management plans, in accordance with the DMA (2002). It means that each provincial government, metropolitan municipality and, if they have the capacity, each district municipality and local municipalities, are required in terms of the DMA (2002) to plan and prepare Disaster Risk Management plans. In terms of the NDMF (2005:42-43), provincial governments have to develop their Disaster Risk Management plans in accordance with the requirements of the NDMF (2005:42-43). Local government (municipalities) have to develop their Disaster Risk Management plans aligned with the Provincial Disaster Management Framework and plans.

The Disaster Risk Management plans serve as a blueprint by which Disaster Risk Management functions such as Disaster Risk Reduction (DRR) and emergency response, recovery and rehabilitation activities are to be planned for and carried out by each relevant municipality (NDMF, 2005:45-47). In addition, the planning for Disaster Risk Management activities must be driven after conducting extensive research with as much information as possible. For this reason, the DMA (2002) makes provision for the establishment of a National Disaster Risk Management Centre, encompassing a Disaster Risk Management Information Centre, which is responsible for the extensive collection of information (IFRC and Red Crescent Societies, 2011:29-31).

According to DPLG (2008a:7), the NDMF (2005) makes provision for four key performance areas and specific objectives concerning Disaster Risk Management, namely:

- Key performance area (KPA) 1 that focuses on the management of information and communication;

- Key performance area (KPA) 2 that makes provision for education, training, public awareness and research related matters concerning Disaster Risk Management;
- Key performance area (KPA) 3 that focuses on disaster risk reduction; and
- Key performance area (KPA) 4 that makes provision for funding arrangements regarding Disaster Risk Management.

In addition to the above Key performance areas, the NDMF (2005) provides specific Key Performance Indicators (KPIs) concerning the various aspects of Disaster Risk Management that serve as tools to guide and to monitor the progress with Disaster Risk Management implementation within the three spheres of government (DPLG, 2008a:7-8).

The NMDF (2005:148) provides for the development of a model to simulate various risk scenarios with a view to creating awareness and effective allocation of resources. It is in this context that this study aims to develop a model for effective management of disaster risks. Firstly, the model to be developed will ensure a common understanding (creating awareness) of the various important concepts of DRM and secondly resources may be allocated according to the main components required for effective disaster risk reduction (NDMF, 2005:148).

2.5.4 Local Government: Municipal Structures Act 117 of 1998

The *Municipal Structures Act, 1998* explains the different categories and types of municipalities as provided for in Section 155(1) of the *Constitution, 1996.* Category A municipalities refers to the establishment of metropolitan municipalities that reside in the mayor social and economic urban centres of the country. Category B municipalities refer to district municipalities. A Category C municipality refers to a municipality that has legislative and executive powers in an area that include more than one municipality (District Municipalities). Currently there are 8 metropolitan municipalities, 46 district municipalities and 231 local municipalities in South Africa (IFRC and Red Crescent Societies, 2010:26).

According to Thornhill (2008:499), the *Municipal Structures Act, 1998* predominantly makes provision for the following:

- The establishment of municipalities, in accordance with the requirements relating to the category and type of municipality;
- To establish criteria for determining the category of municipality for an area;
- To provide an appropriate division of powers and functions among other categories of municipality;
- To regulate the internal structures of political office bearers and senior officials; and
- To provide for appropriate electoral systems.

The *Municipal Structures Act, 1998* further makes provision for the internal systems and structures, of office bearers. It also makes provision for the electoral system for metropolitan and municipal councils and ward elections (Van der Waldt, 2014:46).

2.5.5 Local Government: Municipal Systems Act 32 of 2000 and Local Government: Municipal System Amendment Act 7 of 2007

The preamble to the *Municipal Systems Act,* 32 of *2000* (hereinafter referred to as MSA), states the following:

> The fundamental aspect of the new local government system is the active engagement of communities in the affairs of municipalities of which they are an integral part, and in particular in planning, service delivery and performance management.

Thornhill (2014:870) avers that the MSA (2000) makes provision for the core principles, mechanisms and processes needed to empower municipalities to progress toward the social and economic upliftment of local communities as well as to ensure the effective provision of services and related matters to all local communities.

Section 25(1) of the MSA (2000) provides that each municipal council must adopt a single inclusive and strategic plan for the development of the municipality, namely:

- To link, integrate and coordinate plans as well as to take into account proposals for the development of the municipality;
- To align the resources and the capacity within the municipality with the implementation of the plan;

- The plan serves as a policy framework and general basis on which annual budgets must be based; and
- The plan must be in line and compatible with national and provincial plans and planning requirements.

Section 26 in Part 2 of the MSA (2000) provides that an Integrated Development Plan (IDP) of a municipality must reflect the municipal council's specific development strategies that are aligned with applicable national and provincial developmental priorities, and sectoral plans.

Chapter 4 of the MSA (2000) outlines how a municipality should govern its activities; its requirements such as progress with the Integrated Development Plans, Performance Management Systems (PMS) and the Constitutional requirements for public participation. The Act implies that councillors are required to consult with citizens to get inputs on the municipal budget and the Integrated Development Plan as well as the performance management system of the municipality (Du Plessis and Lues, 2011:104-108).

According to SALGA (2011a:24), municipalities should develop their Disaster Risk Management plans in consultation with other governmental departments to ensure that, when confronted by a disaster, adequate systems are in place for the various governing structures to intervene and render effective Disaster Risk Management support. The IFRC and Red Crescent Societies (2010:26) cite that one of the key objectives of a municipality is its five-year strategic plan, namely the Integrated Development Plan (IDP) that sets out the Municipal Council's vision regarding its development priorities, objectives and strategies for a five-year period, including the municipality's disaster management plan. In terms of the Section 26(g) of the MSA (2000), the integrated development plan of a municipality must reflect applicable Disaster Risk Management plans. Therefore, a municipality has to develop a Disaster Risk Management plan within its IDP (MSA, 2000).

Thornhill (2014:89) explains that the MSA (2000) requires from municipalities to align their integrated development plan with the national and provincial spheres of government including with that of other municipalities within a specific region. Thornhill

(2014:89) further states that it is expected that the integrated development plan of a municipality must promote democratic and accountable local government:

- to promote the effective and efficient service delivery to local communities;
- to obtain social and economic development for formerly disadvantage communities;
- to ensure that the environment is safe and healthy;
- to promote public participation in matters that affect the community; and
- to ensure financial sustainability of all developmental programmes and projects.

Chapter 5 of the MSA (2000) makes provision for the Integrated Development Plan in which a municipality must assess the following:

- The current situation in the municipal area, including available resources, skills and capabilities;
- The needs of the community with and through community structures and individual community members;
- The priority of identified needs;
- Setting goals to meet the community needs; and
- Devising strategies to achieve the goals of the municipality in an effective manner.

In addition to the above, Subsection 24(1) of the MSA (2000) provides that all plans of a municipality must be aligned and should complement the development plans and strategies of other affected municipalities and other organs of state to promote cooperative governance as provided in Section 41 of the *Constitution*, *1996.* Thus, in accordance with the requirements of Section 26(g) of the MSA (2000), it is required that the integrated development plan of a municipality must make provision for the implementation of a Disaster Risk Management plan.

2.5.6 Public Finance Management Act 1 of 1999 and the Local Government: Municipal Finance Management Act 56 of 2003

The *Public Finance Management Act, 1999* (hereinafter referred to as the PFMA) regulates the financial management matters of national and provincial spheres of

government. For the purpose of this study, the focus falls on local government; therefore, the attention was focused in this discussion on the requirements of the *Municipal Finance Management Act*, *2003* (hereinafter referred to as the *MFMA*). According to Thornhill (2014:109), the *MFMA*, regulates financial management in municipalities and it requires that all revenue, expenditure assets and liabilities of municipalities and municipal entities be managed in an efficient and effective manner. The Act also sets out the responsibilities of officials and councillors responsible for financial matters. In terms of Section 53(6) of the *MFMA,* 2003, a mayor has to determine how the integrated development plan of the municipality is taken into account the financial plan or budget of the municipality. Section 2 of the *MFMA*, 2003 makes provision for the management of revenues, municipal expenditures, the municipal assets and liabilities including the handing of municipalities financial affairs, financial planning and budgeting, borrowing and supply chain management. Disaster Risk Management plans form part of the integrated development planning process of a municipality and therefore a municipality also has to take into account its Disaster Risk Management plan in the financial plan or budget of the municipality.

2.5.7 Intergovernmental Relations Framework Act 13 of 2005

The *Intergovernmental Relations Framework Act, 2005* (IGRFA) gives effect to the Constitutional obligation of cooperative governance across the three spheres of government as provided in Chapter 3 of the *Constitution, 1996*. According to Layman (2003:29), the primary object of cooperative government is to provide effective and efficient government cooperation between the three spheres of government. Layman (2003:29-30) further contends that cooperative governance means that the three spheres of government have to promote the following:

- Mutual consultation on policy and legislation;
- Coordinated strategic planning; and
- Accountability for performance and expenditure in terms of legislation.

The IGRFA (2005) further makes provision for the structures and institutions to foster intergovernmental relations among all the three spheres of government. The Act (IGRFA) provides the mechanisms and procedures for settling disputes among all the spheres of government.

In the light of the above, cooperative governance and support from the three spheres of government through intergovernmental relations forums is an imperative when a disaster is declared and when the normal day-to-day functioning of municipality has been disrupted, to such an extent that it requires assistance from other government bodies and external sources. Consequently, when a municipality is affected by a disaster, it will require assistance from the provincial government, and when the provincial government is affected, support will be required from the national government. In this context, there must be cooperation and alignment of the Integrated Development Plan (IDP), incorporating the Disaster Risk Management plan of a municipality with other municipalities and other spheres of government within a specific region.

2.5.8 National Environmental Management Act 107 of 1998

The purpose of the *National Environmental Management Act, 1998* (NEMA) is to provide for cooperative, environmental governance by setting principles for decision-making on matters that affect the environment. Furthermore, organs of state have to promote cooperative governance and procedures for coordinating environmental functions. The Act also makes provision for procedures for coordinating environmental functions of each organ of state. The Preamble of the Act provides that everyone has the right to an environment that is not harmful for their health or wellbeing, and that the government must respect, protect, promote and fulfil the social, economic and environmental rights of everyone. The Preamble of the Act further provides that all people has the right to have their environment protected, for the benefit of present and future generations, by means of legislative and other measures that prevent pollution and ecological degradation, including the promotion of conservation and to secure ecologically sustainable development and the use of natural resources, while promoting economic and social development.

Section 28(1) of the *NEMA, (1998)* provides that any individual, group or organisation involved in pollution or ecological degradation is required to stop or if allowed by a permit to minimise and or correct the situation. Section 28(3) of *NEMA* provides that measures should be in place to investigate, assess and evaluate the impact on the environment. Section 28(3) of *NEMA* further provides that measures must be in place to inform and educate employees about the environmental risks of their work and the

manner in which they have to perform their tasks to avoid significant pollution or degradation of the environment.

2.5.9 The Atmospheric Pollution Prevention Act 45 of 1965 and the National Environmental Management Air Quality Act 39 of 2004

Section 3(a-d) of the *Atmospheric Pollution Prevention Act, 1965* (APPA) makes provision for the prevention of the pollution of the atmosphere. The *National Environmental Management Air Quality Act 39 of 2004* (NEMAQA) was published to repeal the APPA (1965), and various other laws dealing with air pollution. In terms of the NEMAQA (2004), the Department of Environmental Affairs and Tourism, the applicable provincial environmental departments and local authorities are separately and jointly responsible for the implementation and enforcement of various aspects of the act. The purpose of the NEMAQA (2004) is to set the norms and standards concerning air quality management planning; air quality monitoring and information management; institutional frameworks, roles responsibilities; air quality management measures; and lastly to provide general compliance and enforcement.

2.5.10 Occupational Health and Safety Act 85 of 1993 and the Occupational Health and Safety Amendment Act 181 of 1993

The purpose of the *Occupational Health and Safety Act, 1993* (OHSA) is to establish minimum standards and requirements of occupational health and safety for the National Department of Health

- to reduce the risk by identifying hazards and possible risks that could lead to incidents and accidents;
- to set standards of practice including accountability and procedures;
- to measure and evaluate performance against standards;
- to correct deficiencies and deviations; and
- to set standards of procedures to be followed and to create and maintaining a healthy and safe work environment.

Sections 9, 10, 12, 13 of the Act provides what an employer has to do to provide for the health and safety of its employees while they are performing their work in the

workplace. In terms of Section 6.1 of the OHSA (1993), employers have to put in place measures to protect health and safety of its employees against various hazards that may result from their work. Furthermore, employers have to identify potential hazards in the workplace when employees are busy with the production, processing, usage, storage and transportation of articles or any substances, as well as to ensure that the necessary continuous supervision is provided. The Act further provides that the employer must provide and implement specific precautionary measures to protect employees against any hazards when using any equipment. Section 6.1(iv) of the OHSA (1993) further provides that the employer must provide the necessary information, instructions and training to all employees to protect them from any hazards while they are busy with their day-to-day activities. Section 12 of the Act makes provision for the prescriptions concerning a risk management process as such the employer in consultation with its Health and Safety Committee is required

- to identify any risks or potential risks;
- to evaluate these risks effectively;
- to take the necessary steps to protect the employees as well as to prevent and minimize any exposure; and
- to inform the applicable health and safety representatives in the workplace of any remedial action that was taken, as well as the outcome of the results of such an action.

The *Occupational Health and Safety Amendment Act, 1993* was introduced to amend the above Act. Some of the amendments to the *Occupational Health and Safety Act, 1993* inter alia include the amendments to regulate the Constitution of the Advisory Council for Occupational Health and Safety and to regulate the appointment and functions of health and safety representatives in the workplace. This includes amendments to regulate the duty and not to interfere with or misuse things in the workplace as well as to regulate the prohibition on victimization.

Except for the obligation to report any incident of any employee dying, or becoming injured or falling ill, or suffering a loss, as mentioned above, the onus rests on the employer to put in place the necessary measures not only to protect the health and

safety of all employees, but also to protect employees from any potential hazard while they perform their day-to-day activities in the workplace.

2.5.11 The National Water Resource Act 36 of 1998 (NWRA) and the Water Services Act 108 of 1997

According to the IFRC and Red Crescent Societies (2010:37), the *National Water Resource Act, 1998* (NWRA) deals with the use of water resources such as rivers, springs, dams, surface water, aquifers and estuaries, while the *Water Services Act, 1997* regulates the provision of potable water. The IFRC and Red Crescent Societies (2010:37) are of the opinion that the *National Water Resource Act, 1998* is an important legislative prescript concerning disaster risk reduction in that the provision of water services, is a primary function of municipalities under the guidance of national and provincial spheres of government. The Act makes provision for the transferring of powers to Catchment Management Agencies (CMAs) as the primary regulators of water within each catchment area. Sections 8 and 9 of the *National Water Resource Act, 1998* state that the catchment management agencies are responsible for developing applicable catchment strategies, plans, guidelines and procedures for the protection and management of water resources within a specific water management area. Section 80 of the *National Water Resource Act, 1998* further provides that a catchment management agency have to investigate, to advise and to involve the community concerning the management of water, protection, conservation and control of water resources within the specific water management area. In terms of Section 81 of the *National Water Resource Act, 1998*, the members of a governing board of a specific catchment management agency much create a balance between the interests of water users, local and provincial government and environmental interest groups. In the light of the above, the catchment management agencies fulfil a key disaster risk-reduction role.

In terms of Section 91 of the *National Water Resource Act, 1998* water-user associations (WUAs) may be established to ensure that water resources are protected to regulate the flow of any watercourse by reducing the risk of damage to the land in the case of floods, as well as to exercise general supervision over any water resource. A water-user association differs from a catchment management agency in that the user associations operates at a restricted localised level. In terms of Section 145(1) of

the *National Water Resource Act, 1998* the catchment management and the water-user associations have the obligation to provide information to the public concerning a variety of actual or threatened natural hazards such as floods, droughts, any risks posed by a dam, or any risk posed by the quality of water (IFRC and Red Crescent Societies, 2010:38).

2.5.12 National Climate Change Response White Paper, 2011

As a response to the United Nations Framework Convention on Climate Change (UNFOCC) and its Kyoto Protocol that will be discussed in Chapter 3 of this study. A Green Paper of Climate Change was tabled in 2010 and replaced by the National Climate Change Response White Paper (2011). The National Climate Change Response White Paper (2011:5) sets out the climate-change response strategy to achieve the specific national climate-change response objectives such as risk reduction and management; mitigation; sectoral responses; and objectives concerning integrated development planning, to name a few. The National Climate Change Response White Paper (2011:9) makes provision for South Africa's vision and commitment towards sustainable development, promoting a better life for all. The White Paper further outlines the country's commitment to a fair contribution to stabilising global greenhouse gases (GHG) concentrations in the atmosphere. The White Paper also aims to protect the country and its citizens from the impact of climate change.

The national climate change-response objective as provided in the National Climate Change Response White Paper (2011:11) includes the following:

- Firstly, South Africa strives to manage the inevitable climate change impacts by means of applicable interventions that focuses on the country's social, economic and environmental resilience as well as its emergency response capacity; and
- Secondly, the country strives to make a fair contribution to the global efforts to stabilize greenhouse gas concentrations in its atmosphere. Section 4.2 of the National Climate Change Response White Paper (2010:14-15) makes provision for the following strategic priorities to achieve the above national climate change response objectives, namely:

- Prioritise adaptation interventions as part of risk reduction and management to cater for immediate threats to the health and well-being, the ecosystem and the economy of the country and formulating short- and long-term climate resilience, vulnerability and risk management policies and relevant measurements.
- To prioritise effective and efficient mitigation policies, interventions and measurements to address any deviations from the greenhouse gas emissions.
- To involve all key role-players in applicable sectors with the preparation, implementation, monitoring and reporting of comprehensive climate change response strategies and actions.
- Prioritise specific interventions as required in national climate-change policies. In order to maximize the climate change benefits, it is required to review relevant policies on a continuous basis, as well as to align and integrate the climate change policies, legislation and strategies to maximize the advantage of current activities.
- To prioritise the integration of climate change considerations and responses into all applicable national, provincial and local government planning activities including the Provincial Growth and Development Plan, Integrated Development Plans of municipalities, to name a few.
- Prioritise research and the collection of information and early warning systems that could assist with the predictions of climate change and the implications and the effect on the country's society, environment and economy.
- Prioritise cooperation as well as the promotion of research regarding the adaptation of lower-carbon and energy-saving technologies and practices in all sectors.
- Prioritise the usage of applicable incentives to change people's attitude and behaviour towards the creation of a lower-carbon economy and society.
- Promote public awareness through education, training and other programmes to make the public aware of climate change to contribute to a lower-carbon economy and society that is resilient to climate change.
- Comprehensive resource strategies to promote the effective implementation of climate change responses.

The above strategic priorities require that all role-players at national, provincial and local government have to cooperate and to integrate the above responses into their own Disaster Risk Management plans to promote the effective implementation thereof.

2.5.13 Legislation dealing with specific types of disasters

The *Fire Brigade Service Act 99 of 1987,* the *National Veld and Forest Fire Act 101 of 1998* (NVFFA) and the *Safety and Sport and Recreational Events Act 2 of 2010* deals with specific types of disaster. The *Fire Brigade Service Act, 1987* (FBSA) was established before the first democratic elections of 1994 to make provision for the establishment and coordination of all fire brigade services throughout the country. However, since 1994, the local government structures have been realigned and, in many instances, the responsibilities of the fire brigade services have increased without an increase in resources (IFRC and Red Crescent Societies, 2010:33).

The purpose of the NVFFA (1998) is to fight and to prevent specific fires such as veld fires, forest fires and mountain fires in the country. Chapter 3 of the NVFFA (*National Veld and Forest Fire Act, 1998*) makes provision for a rating system concerning the fire danger, whereas Chapter 4 of the Act makes provision for the prevention of veld fires. Section 3 of the Act deals with the establishment of fire protection associations to empower landowners in dealing with veld fire prevention and veld fire combating activities.

The *Safety and Sport and Recreational Events Act, 2010* is another important statue concerning Disaster Risk Management, prevention and risk reduction. The Act is applicable to all sporting, recreational, and other events hosted in a stadium, within a city along a route or at a specific venue. Section 6 of the *Safety and Sport and Recreational Events Act, 2010* requires that the National Commissioner of the South African Police services (SAPS) categorise the potential risks of events as a low-, a medium- or a high-risk event. Section 7 of the Act requires that a safety certificate must be issued by the applicable local government that certifies that the infrastructure of the stadium or venue complies with the requirements including the provision of suitable safe access and facilities for persons with special needs (disabilities) as prescribed in Section 8 and 9 of the Act.

2.5.14 Other important legislation concerning Disaster Risk Management and Risk Reduction

The *Mine Health and Safety Act 29 of 1996* (MHSA), as amended, the *Mineral and Petroleum Resource Development Act 28 of 2002* and the *National Building Regulations and Standards Act 103 of 1997)* are important legislation and regulations concerning Disaster Risk Management and risk reduction.

The purpose of the MHSA (1996) is to make provision for the health and safety of employees who work at a mine, as well as to promote a culture of health and safety. It is important to note that the Act focuses on the establishment of measures to promote safety in the mine as well as to protect the employees from hazardous tasks. The Act does not make provision for hazardous conditions and the impact of mining activities on the environment. However, the *Mineral and Petroleum Resource Development Act, 2010* makes provision for the Minister of Mineral Resources of South Africa to direct the mining authorities to evaluate and remedy a situation when the mining activities cause any pollution or ecological degradation or damage to the environment (IFRC and Red Crescent Societies, 2010:39). The purpose of the *Mineral and Petroleum Resource Development Act, 2010* is to make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources. Section 39 of the *Mineral and Petroleum Resource Development Act, 2002* sets out that numerous types of environmental assessments need to take place before a mining authorisation could be issued to a mine.

Another important Act relating to disaster management and disaster risk reduction for local authorities is the *National Building Regulations and Standards Act, 1997*. The purpose of the *National Building Regulations and Building Standards Act, 1997* is to provide for the promotion of uniformity concerning the erection of buildings in the areas of jurisdiction of applicable local authorities. Section 10 of the Act requires that the local government authority may prohibit the erection of any building or any earthworks on a site if it is being subjected to flooding. Furthermore, Section 12 of the *National Building Regulations and Standards Act, 1997* sets out that a local authority may order the demolition or alteration of any building that is showing any signs of becoming dangerous to life or any nearby property or if the building itself is dangerous. The Act further makes provision for the applicable Minister to make national building

regulations on a widespread and diversity of building issues with the aim to promote disaster risk reduction.

2.5.15 Free State Provincial Growth and Development Strategy (FSPGDS)

The purpose of the Growth and Development Strategy of the Free State Province is to align national policies and programmes with provincial policies and programmes. The Free State Provincial Growth and Development Strategy must be vertically aligned with the National Growth and Development Strategies. National strategies such as the National Spatial Development Perspective (NSDF) and the National Medium term strategies provide guidelines to ensure that the FSGDS are in line with the National Government's strategic vision and strategies. The FSGDS also serves as a guiding document for development within the province as well as to promote effective and efficient management and governance in order to achieve growth and development in the province.

The FSGDS has to be translated into well-defined growth and development programmes that must be translated into departmental and municipal plans within the province. The FSGDS also serves as a guiding document when municipalities (metropolitan, district and local municipalities) allocate their budget according to key growth and development priorities at the beginning of each year.

Furthermore, the FSGDS sets out the following five key priority areas of the province namely:

- To enhance economic development and job creation;
- To provide and facilitating the sustainable development of infrastructure;
- To invest in the development of its people;
- To ensure a safe and secure environment for its people; and
- To promote cooperative governance with the sustainable use of resources and the environment.

The FSGDS promotes cooperative governance to ensure that, through effective intergovernmental relations, coordination is promoted between national, provincial and

local government on matters of mutual interest including aspects such the promotion of a safe and secure environment for the people of the province.

2.5.16 National Development Plan 2030 (NDP), 2013

The National Development Plan, 2030 (2012:199) Chapter 5 further indicates that, by 2030, South Africa will be on its way to promote a more environmentally sustainable, low NDP 2030 (2012:199) carbon-economy, climate-change resilient and just society. Chapter 5 of the National Development Plan, 2030 promotes an environmentally sustainable and equitable transition to a low-carbon economy. In addition, South Africa needs to strengthen the resilience of its communities to the impact of climate change (NDP, 2012:199).

The NDP (2012:210) further emphasises the many challenges concerning effective climate change responses and Disaster Risk Management.

A significant climate-change adaptation strategy is an effective communication system that is required to disseminate authentic information.

There is a clear need to improve DRR. Therefore, a range of government sectors has to consider programmes for the impact of climate change on matters such as water, agriculture, commercial forestry, health, biodiversity, ecosystems and human settlements. The NDP 2030 (2012:210) proposes the following intervention and policy imperatives.

- Firstly, the National Research Foundation (NRF) has to establish a national facility that is dedicated to funding research about climate change adaptation and climate modelling.
- Secondly, the Agriculture Research Council (ARC) also has to focus research activities on climate change and food security.
- Thirdly, the Water Research Commission (WRC) has to continue with current programmes to understand the impacts of climate change on the country's water resources.
- Lastly, the NDMC has to include climate change risks and its communication strategies in the national DMP.

In addition to the above, the following guiding principles are also included to promote a more environmentally sustainable, low-carbon economy, client-change resilient and just society are also emphasised in the NDP, 2030 (2012:200). These are:

- Just, ethical and sustainable;
- Global solidarity and cooperation in relation to environmental risks and threat;
- The protection of the country's ecosystems;
- Cost accounting;
- Effective strategic planning;
- Transformative focus;
- Effective management of the transition process;
- Focus on opportunities to promote sustainability and to attain equality and prosperity for all citizens;
- Effective participation of the community and social partners;
- Effective policy making;
- A regional approach;
- To promote accountability and transparency;
- To promote informed action; and
- To invest early in low-carbon technologies to reduce GHG emissions and to position South Africa to compete in a carbon-constrained world.

The above principles have to guide the transition process to promote an environmentally sustainable, low carbon economy to ensure that related policies and strategies will be implemented in an effective manner. These strategies may be implemented through appropriate actions by role-players, such as local government, district and local DMCs.

2.6 DISASTER RISK MANAGEMENT STRUCTURES AND INSTITUTIONAL ARRANGEMENTS FOR DISASTER RISK MANAGEMENT

In this section, the national, provincial and local-government disaster management structures are outlined.

2.6.1 National Disaster Management forums, centre and committees

The applicable National Disaster Management Forums, Centres and Committees are discussed below:

2.6.1.1 National Disaster Management Advisory Forum (NDMAF)

The NDMAF is an organisation that is made up of representatives from all spheres of government as well as members of public and private organisations who have a stake in Disaster Risk Management. This is a consultative and coordinating forum, which recommends to the Intergovernmental Committee on Disaster Risk Management (ICDM) matters concerning Disaster Risk Management.

Furthermore, the NDMAF also provides advice to all state organs, private and or public sector institutions, on matters relating to Disaster Risk Management (DMA, 2002:11-13). Although, according to the DMA, provinces are not required to establish Provincial Disaster Management Advisory Forums (PDMAF), many provinces have established Provincial Disaster Management Advisory Forums. One advantage of the forums at provincial level is that they allow for greater participation of municipalities, including community- and faith-based organisations, on matters pertaining to Disaster Risk Management (IFRC, 2011:6).

2.6.1.2 National Disaster Risk Management Centre (NDMC)

The National Disaster Management Centre has been established as a public-sector institution and has been in operation since the 1st of April 2008. Its main purpose is to coordinate all activities related to Disaster Risk Management within the country, mainly in disaster risk prevention and mitigation. In order to provide an integrated and cohesive DRM function, the National Disaster Management Centre plays a pivotal role in coordinating the activities of the local, provincial and national governments, as well as the private and public sector stakeholders (DMA, 2002).

In view of the above, it could be argued, that the NDMC plays a monitoring and evaluation role, ensuring that all relevant role-players comply with policy regulations. The centre also plays a consultative and advisory role in policy formulation and

research activities, thereby furthering the aims and objectives of Disaster Risk Management in South Africa (Sithole, 2015: 254-255).

2.6.1.3 Intergovernmental Committee on Disaster (Risk) Management (ICDM)

According to the DMA (2002), the President of the Republic of South Africa is responsible for the establishment of the Intergovernmental Committee on Disaster (Risk) Management (ICDM). In the first instance, this committee must be represented by Cabinet Members of the following portfolios: Agriculture and Land Affairs, Defence, Education, Environmental Affairs and Tourism, Foreign Affairs, Health, Home Affairs, Housing, Minerals and Energy, National Treasury, Provincial and Local Government, Public Works, Safety and Security, Social Development, The Presidency, Transport and Water Affairs.

The first reason for the involvement of these cabinet members is that all of them will be involved in Disaster Risk Management in some way or another. Secondly, MECs who have been appointed by the Premiers of the various provinces as Disaster Risk Management officials must also serve on the ICDM. Thirdly, another group of council members of the ICDM will represent local government and they will be selected by the SALGA (NDMF, 2005:6-13).

The main purpose of the ICDM is to provide for cooperative governance on all matters pertaining to Disaster Risk Management, especially in securing the health and wellbeing of the people of South Africa, as stipulated in Chapter 3, Section 41(b) of the *Constitution,* 1996. Another function of this committee is to provide for a well-coordinated, unified response to disaster risks when the situation arises. For example, during 2009/2010, all nine provinces of South Africa experienced severe flooding; 28 municipalities were declared disaster areas; 40 lives were lost; and more than 20 000 people were displaced (IFRC, 2011). It was also noted, that of the 278 municipalities in South Africa, 92 had failed to budget for disaster risk reduction (DRR). Since there are no formal links amongst the various spheres of government, the planning and coordinating role of the ICDM cannot be discounted, especially for cooperative governance of disaster risks as indicated above (SALGA, 2011b:14).

There is a high proportion of weather-related death and destruction in South Africa because of a lack of accountability and poor coordination of disaster risks. Evidence were provided that between 1980 and 2010 South Africa experienced 77 disaster events, resulting in 1 869 deaths – an estimated 60 per year – affecting 18 456 835 people and costing the country an estimated R3,4 billion in economic damages (Prevention Web, 2011:2). Further to this, 33% of the municipalities failed to make any financial arrangements (budgeting) in this regard, due to the lack of capacity to manage disaster risks effectively in South Africa (Prevention Web, 2011:2).

The ICDM is representative of all three spheres of government, the private and public sector, including various relevant stakeholders. In addition, the chairperson of the ICDM is a cabinet member, who is appointed by the president to administer the DMA for the country. In this regard, the ICDM developed the NDMF (2005), a blueprint used by disaster management practitioners to develop their disaster management framework and subsequently their plans, by the various spheres of government. Therefore, it could be argued, that the ICDM is suitably located, has the political will and influence to advise cabinet on DRM services adequately within the three spheres of government in South Africa (DMA, 2002).

However, a study conducted in 2011 by Van Niekerk (2011:76-100) found that there was a lack of effective communication amongst the various role-players, namely politicians at national, provincial and local levels regarding Disaster Risk Management. As a result, the effectiveness of Disaster Risk Management as a service-delivery imperative has been compromised. Further to the lack of communication, Van Niekerk also found that that there was very little cooperation amongst the various structures of government.

Therefore, inasmuch as the ICDM has the necessary political influence, and is well situated to command the necessary support, it could safely be deduced from Van Niekerk's findings that the ICDM is ineffective. Lack of funding and the incapacity to render effective Disaster Risk Management services were cited as other reasons for the ineffectiveness (Van Niekerk, 2011:76-100).

2.6.2 Provincial Disaster Risk Management structures and institutional arrangements

The Provincial Disaster Risk Management structures and institutional arrangements are outlined below:

2.6.2.1. Provincial Disaster Management Advisory Forum (PDMAF)

According to the NDMF (2005), Section 1.3.1.3: Municipal Disaster Management Framework (2005) states that the establishment of Provincial Disaster Management Advisory Forum in each province is not a legal obligation. Since there is no legal basis for the establishment of a Provincial Disaster Management Advisory Forum, it will be difficult for a disaster to be coordinated provincially – a requirement of the DMA (57 of 2002). For this reason, the NDMF (2005:34) strongly recommends the establishment of the Provincial Disaster Management Forum or, in its absence, to establish an alternative coordinating body. The PDMAF is a forum that functions within the ambit of the Provincial Disaster Risk Management Centre.

It must be emphasised that the PDMAF is not a decision-making body, but only an advisory body that offers support and advice to the relevant authorities on all DRM initiatives in a province. This forum is centrally located between the NDMC on the one hand and the Metropolitan and District Disaster Risk Management Centres on the other hand. Under normal circumstances, these forums meet quarterly or four times a year. Although it is only an advisory forum, it plays a very significant role as far as DRM is concerned. This is so because it offers a platform to a wide range of stakeholders, with a stake, in the wellbeing of vulnerable communities, which are in most instances poor and needy (Van Riet and Diedricks, 2009:4-6).

Another important reason for the establishment of the PDMAF is that senior officials from a broad network, covering the entire province, meet at this forum. All these officials have decision-making capacity within their respective institutions and can therefore chart the way forward regarding the implementation of the provincial DRM plans at the institutions they represent. They have a critical role to play in the successful implementation of the plans in individual provinces and, subsequently, in the entire country (NDMF, 2005:16).

2.6.2.2 Provincial Disaster Management Centres (PDMC)

According to the DMA of 2002, every province in South Africa must establish a Provincial Disaster Management Centre (PDMC). The Provincial Disaster Management Centre must be located and function from within a specific government department designated by the premier of that province. Consequently, the PDMC is located within the Office of the Premier, because DRM spans all provincial government departments and requires crosscutting support from the highest level within the province (PDMF, 2005:18).

Another important responsibility of the PDMC is to coordinate province-wide activities pertaining to Disaster Risk Management, including education and training, capacity building, research and development within the province. In addition, the PDMC is a critical institution regarding Disaster Risk Management in a province since it links the metropolitan and district DRM Centres to the national DRMC.

Furthermore, the PDMC provides a supportive role to the NDMC, Metropolitan Disaster Risk Management Centre and the District Disaster Risk Management Centre. For the reasons indicated above, the prominence of the location of the PDRMC cannot be discounted; therefore, it is located within the Department of the Premier (NDMF, 2005:25).

2.6.2.3 Provincial Disaster Management Framework (PDMF)

Each of the provinces in South Africa must, according to Chapter 4 of the DMA: Part 1 (Provincial Disaster Management Framework), must develop a Disaster Risk Management Framework (PDRMF) for their respective provinces. The framework must comply with the provisions of the DMA of 2002. According to this framework, all governmental and nongovernmental organisations, including government departments, faith-based and community-based organisations will be assigned specific roles and responsibilities.

Thus, the framework will act as a coordinating tool for the activities of the various role-players in the province and in so doing, chaos and confusion that usually follow a disaster will be minimised. The importance of the framework cannot be discounted

since it is the overarching controlling body, for Disaster Risk Management in the province. Its main responsibility is to maintain some semblance of order, since it is the main link between the National Disaster Risk Management Centre and the District Disaster Risk Management Centre in South Africa (DMA, 2002:34).

However, it must be emphasised that all Disaster Risk Management plans in a specific province must use their Provincial Disaster Risk Management Framework as a guiding document to compile their individual DRM plans.

2.6.3 Municipal Disaster Risk Management structures and institutional arrangements

Next, the Municipal Disaster Risk Management Structures and Institutional Arrangements are discussed.

2.6.3.1 Municipal Disaster Management Advisory Forum (MDMAF)

The local municipality is at the forefront of the institutions that provide Disaster Risk Management services to any community; yet the DMA (2002) does not make provision for the local municipalities (district and metropolitan municipalities) to establish a forum or an institutional and or interdepartmental governing structure for this purpose. As the community is the first respondent to a disaster, it is in its interests and those of the local government to have in place a coordinating committee or forum to manage disaster risks. This committee should play a leading role in the management of disasters to prevent large-scale loss of lives and damage to infrastructure. For the above-mentioned reason and in terms of Section 16(3) of the *Disaster Management Amendment Act 16 of 2015,* a local municipality must establish capacity to develop and implement a DMP. Section 16(4) of the *Disaster Management Amendment Act, 2015* further makes provision for the establishment of a DMC within a local municipality, in consultation with the relevant district municipality.

According to the NDMF (2005:34-35), metropolitan and district municipalities have to use their discretionary powers to form a Municipal Disaster Management Advisory Forum (MDMAF), since it is not prescribed by the Act. The lack of a Disaster Risk Management Centre seems to have a negative impact on the formation of these

forums and therefore SALGA (2011b:29) explains that 68% of the municipalities in South Africa have indicated that they have no Municipal Disaster Management Advisory Forums in place.

The researcher argues that the establishment of Municipal Disaster Management Advisory Forum (MDMAF) for metropolitan municipalities is of critical importance. Using the Gauteng Province as an example, the province comprises three metropolitan municipalities with a population of over ten million. All of these metropolitan municipalities are neighbours and are all susceptible to earthquakes. If the epicentre of an earthquake, measuring over 5,3 on the Richter scale strikes the Johannesburg Metropolitan Municipality, then a disaster of catastrophic proportions must be expected, as was discussed under Municipal Disaster Management Framework (MDMF).

Since the Provincial and National Disaster Risk Management Advisory Forums are very important structures that play a critical role in the operations of disaster management at provincial and national levels, respectively, it may be argued that their establishment warrants some form of a legislative prescription for purposes of compliance. According to Pelling and Wisner (2012:5), many African governments have Disaster Risk Management policies and legislation in place; however, they do not have the resources or the political support to undertake risk reduction initiatives. For this reason, National and Provincial Disaster Risk Management Advisory Forums play a critical role in South Africa in advocating for political support.

2.6.3.2 Municipal Disaster Management Centres and Municipal Disaster Management Plan

In terms of the DMA (2002), only metropolitan and district municipalities are required to establish Disaster Risk Management Centres. The DMA (2002) further requires that district municipalities must establish DRM Centres in consultation and in partnership with municipalities within their jurisdiction. However, the *Disaster Management Amendment Act, 2015* makes provision in Section 16(4) that a local municipality may establish a Disaster Management Centre in consultation with the relevant district municipality. This must be in accordance with the terms set out in a service level agreement and in accordance with national norms and standards. Section 45 of the

Disaster Management Act 57 of 2002 provides that a municipal council must appoint a person as head of the municipal Disaster Management Centre. The main function of the MDMC is to give direction in the implementation of disaster risk-related policies to achieve provincial and national disaster risk-related objectives. Another important function of the MDMC is to lend support to the Provincial and National Disaster Management Centre (NDMF, 2005:14).

Section 44(1) of the DMA (2002) makes provision for the following powers and duties of a municipal Disaster Management Centre:

- The municipal Disaster Management Centre must specialise in disaster and disaster management issues in the specific municipal area.
- It must promote an integrated and coordinated approach to disaster management in the municipal area, with special attention to the prevention and mitigation by departments and all role-players within a municipality, including municipal entities, and other role-players involved in disaster management in the municipal area.
- The Centre must act as a repository concerning information about disasters, impending disasters and disaster management.
- The Centre may act as an advisory and consultative body concerning disasters and disaster management matters in the municipal area for communities, individuals, organs of state, private sector and non-governmental organisations.
- The Centre has to make recommendations based on the funding of disaster management in the municipal area as well as to facilitate and initiate efforts to make funding available.
- The Centre has to make recommendations to the relevant organs of state concerning draft legislation affecting the DMA (2002) and the NDMF (2005), as well as the relevant Provincial Disaster Management Framework.
- The Centre must promote recruitment, training and participation of volunteers in disaster management in the municipal area.
- It must promote disaster management capacity building training in the municipal area, including at schools.

- It may promote research concerning all aspects of disaster management in the municipal area.
- The Centre may give advice and guidance by disseminating information about disaster management in particular to the communities who are vulnerable to disasters in the municipal area.
- The Centre may assist in the implementation of applicable legislation.

2.6.3.3 Municipal Disaster Management Framework (MDMF)

The DMA (2002) also provides that every metropolitan and district municipality is required to establish a Disaster Risk Management Framework. Provincial Disaster Risk Management Framework of a province must be used as a guide when metropolitan and district municipalities develop their individual frameworks. Although every metropolitan and district municipality is required to develop their Disaster Risk Management Framework based on their specific needs and wants, it must be based on the provincial framework of that province.

The reason for this directive is that the resources of a province will be mobilised in the event of a disaster in any specific municipality. The province will then take on the role of a command centre from where resources will be distributed, especially when more than one municipality is affected by a disaster at the same time. For example, it must be remembered that on the 5th August 2014, an earthquake measuring 5.3 on the Richter scale struck Orkney, a small mining town about 120 kilometres southwest of Johannesburg. Although there was not a significant amount of damage, the impact of this earthquake was felt in five of South Africa's provinces. The affected provinces were the Free State, KwaZulu-Natal, Gauteng, North-West and Mpumalanga. (Hosken, 2014:1).

Accordingly, if an earthquake of a higher magnitude than 5,3 on the Richter scale strikes Johannesburg, which is also a mining area and very susceptible to earthquakes, then the consequences could be devastating for South Africa. The reason for this is that Johannesburg is a metropolitan area bordered by two other metropolitan areas: The Ekurhuleni Metropolitan Municipality on the one side and the Germiston Metropolitan Municipality on the other. These are three very densely populated metropolitan municipalities in South Africa. Furthermore, Johannesburg is

regarded as the economic hub of Africa, with a well-developed infrastructure. Together these three metropolitan municipalities are home to over 10 million people; therefore, many lives could well be lost, should a higher-magnitude earthquake strike. In addition to the loss of human life, infrastructure damage could run into millions of rands as well.

For this reason, all district and metropolitan municipalities must develop their Disaster Risk Management Framework, within the ambit of the provincial Disaster Risk Management Framework. The reason for this approach is that in the event of a disaster, a well-coordinated and effective response and recovery mission can be carried out with optimal use of resources by the Provincial Disaster Risk Management authorities.

This means that in the event of a disaster in the Gauteng Province, where three metropolitan municipalities are affected at the same time, the best possible use of the provincial resources must be made. Therefore, it is important that district and metropolitan municipalities develop their disaster management framework, using the provincial framework as a basis.

2.7 OTHER ROLE-PLAYERS TO PROMOTE DISASTER RISK MANAGEMENT

Various government departments and other organs of state in all spheres of government fulfil an important role to reduce disaster risks, which include the following:

- The Department of Cooperative Governance and Traditional Affairs (COGTA) is the focal point for disaster management in South Africa. (COGTA) is tasked with the responsibility of conducting risk assessments at national level through the National Disaster Management Centre.
- The South African Defence Force and the South African Police Service. In terms of Section 7 of the *Disaster Management Amendment Act, 2015*, in any event of a disaster or a potential disaster, the South African Defence Force and the South African Police Service are required, or any other organ of state may be called to provide assistance to the national disaster management structures that were discussed above.
- The Department of Agriculture is responsible for providing support and assistance in the following cases: droughts, floods, fires, locust outbreaks and

in the case of severe weather conditions. The department is responsible for the issuing of early warning information and daily extreme weather warnings that includes precautionary measures for different hazards available on the National Development Agency (NDA) and Agricultural Geo-Referenced Information Systems. The Department of Agriculture also rolled out an awareness programme to educate farming communities about disaster risk-reduction principles (Vermaak and Van Niekerk, 2004:559-560; Ngcamu, 2011:107).

- The Department of Water Affairs and Forestry is responsible for national water management, urban water supply, monitoring of rainfall and weather patterns, dam, rivers and reservoir levels and irrigated rural agriculture. According to the National Disaster Management Centre (2007:88), the department provided specific veld-fire management strategies, and developed the National Fire Danger Rating System (Vermaak and Van Niekerk, 2004:559-560).
- The Department of Minerals and Energy is responsible to conduct risk assessments concerning matters such as radioactive materials, pollution and hazardous waste, as well as mining safety. The Department of Minerals and Energy is responsible for monitoring the Koeberg atomic energy plant in Cape Town.
- The Department of Environmental Affairs and Tourism is responsible for deals with the following matters: pollution, hazardous waste and radioactive materials.
- The Department of Social Development fulfils an important role in the alleviation of poverty by means of the implementation of various development and poverty alleviation programmes. The department is further responsible for assisting with risk assessment and the reduction of communities' vulnerability to disasters as well as to deal with HIV/AIDS-related matters, including HIV/AIDS orphans.
- The Department of Housing is responsible for assessing risks in relation to adherence to building standards, informal settlements, provision of infrastructure and other related matters such as soil stability, slope angles, flood lines and housing densities.
- The Department of Health oversees the various Provincial Departments of Health's disaster management policies and plans and monitors the implementation thereof. Since 2010, a Disaster Management Subcommittee

was established that focuses on in-hospital disaster preparedness, policies and procedures, including training, concerning disaster management and preparedness planning, and other related activities (NDMC, 2006:83).

- The South African Weather Service is responsible for providing meteorological data and the South African Bureau of Standards is responsible for developing standards of risk assessment for usage by local government (Vermaak and Van Niekerk, 2010:559-560). South African Urban Search and Rescue (SAUSR) provides assistance to other countries with disasters.

Since 1999, a volunteer rescue team of South African Urban Search and Rescue has provided assistance and responded to foreign disasters in Turkey, India, Algeria, Iran, Pakistan, Thailand, India, Nepal and Mozambique. It is also responsible for providing training courses whereby responders are trained on aspects such as structural collapse rescue, water rescue, technical rescue and other rescue activities (NDMDC, 2006:90).

Vermaak and Van Niekerk (2010:560) further state that the above national departments and organs of state should maintain risk assessment measures within their own jurisdictions. The Interdepartmental Management Committee (IDMC) is responsible for coordinating the various responsibilities and activities of the above national departments and organs of state (Vermaak and Van Niekerk, 2010:560).

2.8 THE ROLE OF PUBLIC PARTICIPATION AND COMMUNITY INVOLVEMENT IN THE AFFAIRS OF LOCAL GOVERNMENT INCLUDING DISASTER RISK MANAGEMENT

Fox and Meyer (1995:20) refer to community participation as the involvement of citizens within a wide range of administrative policy-making activities, which include the determination of priorities, levels of service, acceptability of physical construction projects in order to orientate government programmes towards community need, to build public support, and to encourage a sense of cohesiveness within a society. The MSA (2000) commits in Section 16 of Chapter 4 that the local community must take part in the preparation, implementation and review of the municipalities' Integrated Development Plans (IDPs), including Disaster-Risk Management plans. This means

that all municipalities must create a platform for public participation concerning the Integrated Development Planning process.

The DPLG, IDP Guide Pack VI (2001:15) contends that an integrated development planning representative body must be established to promote the participation of communities in a municipality's Integrated Development Planning (IDP) process. Thus, community participation in the Integrated Development Planning (IDP) process and for the purpose of this study Disaster Risk Management requires effective communication between the community and the municipality to address the needs of the community and to ensure that assumptions and unrealistic expectations can be dispelled.

The DPLG, IDP, Guide Pack, VI (2000:120-123) proposes that an Integrated Development Planning Forum (IDP Forum) needs to be established to promote effective participation of community members during each phase of the Integrated Development Planning (IDP) process. Van der Waldt *et al.* (2007:105) cite that the purpose of this forum is to provide a structure for discussions, negotiations, joint decision-making and participation in the planning and implementation process of local government issues such as integrated development planning. Van der Waldt *et al.* (2007:105) state that members of the forum should participate in the design and evaluation of project proposals and are responsible for monitoring the implementation performance of the municipalities as well. Govender, Khan and Moodley (2007:72) cite that most municipalities chose to establish ward committees to comply with the aspect of public participation concerning the Integrated Development Planning and Disaster Risk Management processes. However, some municipalities chose to refer to these participatory structures or development forums that have the same purpose as the ward committees (Van der Waldt *et al.,* 2007:105).

The DPLG, IDP Guide Pack O, An Overview (2000:15-19) prescribes that the process of developing an Integrated Development Plan (IDP) should consist of five phases, which should be carried out in consultation with the community. Furthermore, The DPLG, IDP Guide Pack O, An Overview (2000:15-19) prescribes that the process of developing an Integrated Development Plan (IDP) should consist of five phases, which should be carried out in consultation with the community. These five phases are

discussed in detail in Chapter 2 Section 2.4.1: The Municipal Integrated Development Planning Process and Disaster Risk Management.

Public participation in the Integrated Development Planning process is not only a legislative requirement, but without it, the municipality's Integrated Development Plan (IDP) would become just another strategic plan that fails to respond to the expectations and needs of the public within a specific municipal area.

The NDMF (2005:1) states that the purpose of a well-coordinated response to disasters is that time is of the essence, especially when it comes to saving lives during the disaster. A well-coordinated response to disasters can only be take place if all role-players are actively involved in the development of Disaster Risk Management plans so that, in the event of a disaster, everyone is aware of their individual as well as their collective responsibility.

Notwithstanding this, the effectiveness and efficiency of the Disaster Risk Management services provided will be dependent on the capacity of the officials and the communities (volunteers) involved in the Disaster Risk Management services. Therefore, the communities (volunteers) and the local government disaster management practitioners must, in consultation with one another, participate in the development of the Disaster Risk Management plans and prepare to avert the chaos that normally follows a disaster (NDMF, 2005:1).

Furthermore, when developing Disaster Risk Management plans as part of the IDP, municipalities must plan cooperatively with other spheres of government for the purposes of effective coordination and mutual benefit of the communities. This cooperative planning and governance must also be considered as an attempt to minimise the chaotic responses that usually follows the onset of a disaster (NDMF, 2005:1).

One could argue that engagement with communities in the development of the municipalities' integrated development planning process, which includes the Disaster Risk Management plans, is very important. One of the reasons for this support is to avert the initial sets of chaotic responses that usually follow disasters. Another reason

is that search and rescue, recovery and rehabilitation services, which must include community members, need to be well coordinated to save time (NDMF, 2005:1).

2.9 PRINCIPLES FOR EFFECTIVE DISASTER RISK MANAGEMENT

All Disaster Risk Management officials must understand the basic principles necessary for effective Disaster Risk Management. The following are some guidelines adopted by the Caribbean Development Bank (CDB – Disaster Management Strategy and Operational Guidelines, 2009:3).

- Adoption of a holistic multihazard approach focusing on disaster risk reduction and climate change.
- Disaster Risk Management/Climate Change must be integrated into social, economic and environmental sectors.
- Public awareness is essential for changing attitudes and behaviour and must form an integral part of risk reduction.
- Disaster Risk Management must improve organisational arrangements and use resources more efficiently.
- Disaster Risk Management must strengthen partnerships, advance regional cooperation and integration (CDB – DRM Strategy and Operational Guidelines 2009:3).

Although all of these principles are important for effective Disaster Risk Management, this study attempts to develop an integrated model to improve organisational arrangements and encourage efficient usage of resources. Therefore, the fourth principle relates directly to the integrated model to be designed.

2.10 CONCLUSION

This chapter outlined the theoretical overview of Disaster Risk Management in the context of South Africa. It highlighted the emergence and reforms of Disaster Risk Management. The disaster risk profile of South Africa and the effects of climate change on the country were provided to emphasise the important role of each sphere of government concerning Disaster Risk Management and disaster risk reduction. The key concepts and mechanisms of Disaster Risk Management were provided. From the

discussion, it was stated that in the international arena, the term *Disaster Risk Management* is widely preferred, compared to “disaster management” as a concept. It was also emphasised that that disaster risk reduction is an underlying tenet of Disaster Risk Management in its definition, as provided for by the DMA (2002).

The DMA (2002) explains that Disaster Risk Management is a continuous, integrated, multisectoral, multidisciplinary process of planning and implementation of measures:

- To prevent or reduce the risk of disasters;
- To mitigate the severity or impact of disasters;
- To plan for emergency preparedness, rapid and effective response to disasters; and
- To make provision for post-disaster recovery and rehabilitation measures.

The chapter clearly emphasised that for the purpose of this study, the term ‘Disaster Risk Management’ is used rather than ‘disaster management’.

The development of a national statutory and regulatory framework of Disaster Risk Management and disaster risk reduction was emphasised, followed by a detailed discussion about the Disaster Risk Management structures and institutional arrangements for Disaster Risk Management. The key role-players to promote Disaster Risk Management were discussed. The chapter concluded by explaining the role of public participation in local matters, including the integrated development planning process and Disaster Risk Management plan and strategies of a municipality.

In this chapter, it was emphasised that Section 29 and Section 43 of the DMA (2002) provide that each sphere of government have a role to fulfil concerning disaster management in that national, provincial and local spheres have to establish Disaster Management Centres. From the discussion it is clear that, while Section 42 of the DMA Act (2002) provides that each district and metropolitan municipality must establish a Municipal Disaster Management Framework and a Disaster Management Centre, one has to take note of the provisions of Section 16(3) of the *Disaster Management Amendment Act 16 of 2015* that states that a local municipality must establish capacity for the development and implementation of its disaster management function and disaster management plan.

From this discussion it became clear that South Africa is subject to a wide variety of natural and human-induced hazards that often lead to disaster events such as floods and storm-related events; droughts and water shortages; fires, including urban and rural fires; dam failures; mining-induced earthquakes; sinkholes; epidemics; spillages of hazardous waste; and even acid-mine drainage. It was also emphasised that other forms of human-induced hazards that often lead to disaster events in South Africa are the rapid spread of fires and even flash floods in informal settlements that have been subjected to rapid spread of fires and even flash floods. It may be inferred that climate change, which is the main cause of unpredictable weather patterns all over the world, contributes to the unexpected disasters and events.

It was highlighted that the National Climate Change Response White Paper (2011:8) provides that the past decade was known as the hottest on record, due to rapid increases in average temperatures throughout the world and that it has an impact on South Africa.

The discussion also emphasised the important role of local government during disastrous events in that the impact is felt the most at grassroots levels. The cloudburst and floods in Ekurhuleni (East Rand area in Johannesburg) on 09 November 2016, left almost 200 homes washed away in Alexandra. Thousands of motorists were stranded and some were washed away – a typical example of extreme weather events in the country, while other regions have experienced severe droughts since 2012 local communities are more vulnerable to disaster events. This is where smaller but most frequent hazards occur, such as the above extreme weather situations and where the costs in terms of loss of lives and infrastructure and financial burden are felt the most.

Furthermore, the discussion emphasised that the majority of the population in South African are vulnerable to poverty, low standards of living and high levels of unemployment. The high levels of poverty in South Africa contribute to the fact that disadvantaged communities are extremely vulnerable to disasters. The above discussion emphasised the fact that each local municipality has a different risk profile and each town or city faces a variety of different hazards and risks. The chapter provides that, in terms of Chapter 5 of the National Development Plan, 2030 about the promotion of environmental sustainability and equitable transition to a low-carbon

economy, South Africa needs to strengthen the resilience of its communities to the effects of climate change.

The chapter also outlines that in terms of Section 25(1) of the MSA, 2000, each municipal council has to adopt a single, inclusive, integrated development plan, including a Disaster Risk Management plan of the municipality. It is emphasised in terms of Section 26 of the MSA, 2000 that the core components of the Integrated Development Plan (IDP) of a municipality must reflect the following:

- the municipal council's vision for the long-term development of the municipality, with special emphasis on the municipality's most critical development and internal transformation needs;
- an assessment of the existing level of development in the municipality which must include an identification of communities, which do not have access to basic municipal services;
- the council's development priorities and objectives for its elected term, including its local economic development aims and its internal transformation needs;
- the council's development strategies, which must be aligned with any national or provincial sectoral plans and planning requirements binding on the municipality;
- the council' operational strategies, including Disaster Risk Management strategies; and
- to develop a Disaster Risk Management plan and a financial plan (budget), which must include a budget projection for at least the next three years.

From the discussion in this chapter, it may be inferred that during the analysis phase of the municipal integrated development planning, disaster management information should be obtained regarding which types of hazards are common in the area, the magnitude of disasters and their effects on the people and the municipality. It is highlighted, that during the strategies phase of the integrated development planning process, the municipality has to formulate specific disaster management strategies that focus on prevention strategies, vulnerability reduction strategies, contingency plans, a risk-reduction strategy, a disaster-response strategy and strategies to improve the municipalities' capacity to deal with hazards or disasters. Specific Disaster Risk

Management projects such as the establishment of a Disaster Management Centre or a livelihoods analysis should be identified during the project phase. The discussion also emphasised that a Disaster Risk Management plan should include the following; a risk profile of the municipality; a risk-reduction strategy; a disaster-response strategy, emergency preparedness; and disaster management information system. During the approval phase, it was explained that the municipal council had to give the public an opportunity to comment on the draft IDP and Disaster Risk Management plan and other applicable plans.

This chapter further highlighted the importance of the National Disaster Management Centre in that it plays a pivotal role in coordinating the activities of the local, provincial and national governments, as well as private and public sector stakeholders. All Disaster Risk Management plans in a specific province must use their Provincial Disaster Risk Management Framework as a guiding document to compile their individual DRM plans. From the discussion about the municipal Disaster Risk Management structures and institutional arrangements, it is clear that in terms of the DMA (2002), only metropolitan and district municipalities are required to establish Disaster Risk Management Centres.

It is also emphasised, in terms of Section 43(2) of the DMA (2002), a local municipality may establish a Disaster Management Centre through consultation of the relevant district municipality, in accordance with the terms set out in a service-level agreement and in accordance with national norms and standards.

Lastly, it is argued that, in terms of the Section 16 of the MSA, 2000, the local community must take part in the preparation, implementation and review of the Disaster Risk Management plans, which is an important component of a municipality's IDP.

In the next chapter, the study will focus on the state of all Free State Municipalities regarding Disaster Risk Management services.

CHAPTER THREE: DISASTER RISK MANAGEMENT SERVICES IN THE FREE STATE MUNICIPALITIES

3.1 INTRODUCTION

The management of disasters is very complicated, since it requires a multidisciplinary, multidimensional and concerted approach. In addition, there are many technical, financial and human resource challenges, which makes it difficult for some municipalities to fulfil their disaster risk management obligations.

This chapter focused on the disaster risk management operations in all the Free State Municipalities including the Free State Provincial Disaster Risk Management Centre. An extensive study of the available policies, plans, quarterly and annual reports were studied, which was endorsed by the empirical study. In addition, a general overview of Disaster Risk Management in three of the eight Metropolitan Municipalities in South Africa, namely the City of Cape Town Metropolitan Municipality, the Ekurhuleni Metropolitan Municipality in the Gauteng Province, and the Mangaung Metropolitan Municipality in the Free State Province was carried out. This information was validated by semi-structured interviews conducted with the head of the Disaster Management at the respective centres.

3.2 BACKGROUND

In 1994, the Cape Flats in South Africa experienced severe flooding and there were no comprehensive government plans available to manage disasters adequately. As a result, a new thinking emerged on the part of government and in February 2008, the Green Paper of Disaster Management, 1999, which was the foundation for principles and practices in DRM, was developed and distributed for comments. The subsequent White Paper on Disaster Management, which was built on the foundations of the Green Paper, was rigorously scrutinised by various stakeholders and in 2002, the DMA (2002) was established. For this reason, the NDMF (2005) was developed as a blueprint for DRM institutions to use as a guideline to develop their DRM Plans.

Although the DRMF (2005) served as a support tool, municipalities were still experiencing challenges. For instance, five of the nine provinces (55%) and 44

municipalities (metropolitan and district) out of 257 municipalities in South Africa have not submitted DRM frameworks of acceptable levels (IFRC and Red Crescent Societies, 2011:49). Deidrick's and Van Riet (2010:155) cite the lack of funding, under/undeveloped infrastructure and lack of human resource capacity, which includes ignorance on the part of senior officials, as reasons for the challenges experienced by municipalities (Deidrick's and Van Riet, 2010:155).

The International Federation of Red Cross and Red Crescent Societies (2013:15) argue that the National Disaster Management Centre provides sufficient guidelines to municipalities for the development and implementation of their disaster risk management plans. These include handbooks, manuals, step-by-step guides and many policies. In spite of all these support, disaster risk management is still not as effective (IFRC and Red Crescent Societies, 2011:49).

However, to understand how DRM functions in the Free State Province better, this study undertook an in-depth analysis of all 19 local municipalities, the four district municipalities and the one metropolitan municipality. The study further included three of the eight metropolitan municipalities, the Mangaung Metropolitan Municipality of the Free State Province, the City of Cape Town Metropolitan Municipality (Western Cape Province), the City of Ekurhuleni Metropolitan Municipality in Gauteng Province. The reason for studying the three metropolitan municipalities was that they are the largest municipalities in South Africa requiring much more resources than the other municipalities.

The City of Cape Town Metropolitan Municipality was studied because it is a level-three (highest-ranked) coastal municipality, prone to large-scale flooding and fires and has been awarded "Role-model" status by the United Nations. The Ekurhuleni Municipality was selected because it is an aerotropolis; its infrastructure is comparable to some small countries, and it is vulnerable to natural as well as human-induced disasters. A major disruption to the OR Tambo International Airport may affect the entire country.

The Mangaung Metropolitan Municipality is the smallest, less densely populated of the three municipalities. However, it is the economic hub and the most densely populated area in the Free State Province. A major disaster could seriously disrupt the normal

functioning of the city as well as the entire province and therefore it was important for this study to establish which South African National Ministry is responsible for DRM. The reason is that this study should contextualise how DRM fits into the structure of the Ministry concerned.

3.3 LOCATION OF DISASTER RISK MANAGEMENT

According to SALGA (2011:9), Disaster Risk Management is supposed to reside within the Presidency at national sphere, at the Premier's department at provincial sphere or within the department of the Mayor at local sphere. The reason for this placement is that it should receive the highest level of political support from the sphere of government within which the DRM is situated. Another reason for this location is that disaster risk management is a management function that cuts across all departments and should not function as an independent department, unit or section (SALGA, 2011:9).

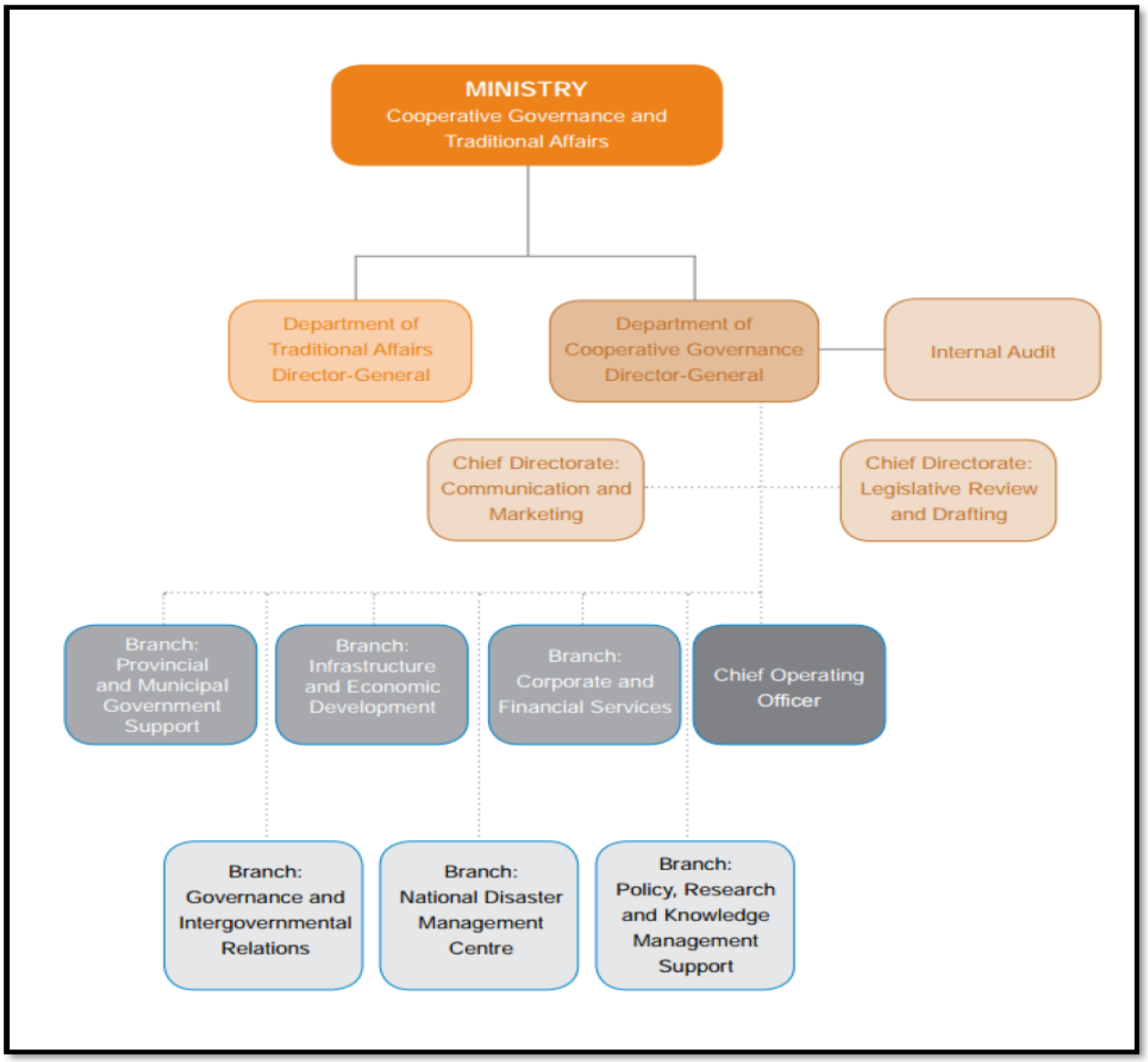
3.3.1 Cooperative Governance and Traditional Affairs

In the South African context, DRM is located within the ministry of Cooperative Governance and Traditional affairs, as illustrated by Figure 3.1 below.

In this regard, the Ministry of Cooperative Governance and Traditional Affairs comprises two departments, namely the Department of Traditional Affairs and the Department of Cooperative Governance, as indicated in Figure 3.1 below. These two departments are further subdivided into the following six programmes for administrative and budgeting purposes, as indicated in Figure 3.1 below:

- Provincial and Municipal Government Support
- Infrastructure and Economic Development
- Corporate and Financial Services
- Governance and Intergovernmental Relations
- Policy, Research and Knowledge Management Support
- National Disaster Management Centre

Figure 3.1. Locating Disaster Risk Management services in South Africa



(Source: COGTA, 2013:19)

Additionally, these functional areas, specifically the six programmes including the branch, National Disaster Management Centre, relate to this study. These six branches report to the Chief Operating Officer, who accounts to the Director-General of the Cooperative Governance and Traditional Affairs Ministry. Thus, the Minister is the highest-ranking political office bearer in this Ministry (Annual Report: CoGTA, 2013:19).

From the above discussion, one may argue that Disaster Risk Management services are appropriately located in terms of intergovernmental relations, Infrastructure Development Policy Development, Research and Corporate Financial Services.

However, this study proposes that Disaster Risk Management services must be linked to the Department of Environmental Affairs since climate change which is the main cause of weather-related disasters are also an integral component of the Department of Environmental Affairs.

3.3.2 Disaster Risk Management and South African Local Government Association (SALGA)

This section will address the important role that the South African Local Government Association (SALGA) plays in addressing the concerns of the municipalities in South Africa. The reason for this is firstly, there are various categories of municipalities and secondly they are located in urban and rural parts of the country.

Since the municipalities are spread across the entire South African landscape, the South African Local Government Association (SALGA) has been established to act as the voice of the municipalities in its day-to-day operations. Some of the main responsibilities of SALGA are to lobby, advocate and represent the interests of local government, to act as the employer body, to build capacity amongst municipalities, support and advise its members, strategically profile its members and to act as a conduit for knowledge and information sharing. However, the administrative and functional competency of Disaster Risk Management is the responsibility of the municipalities at local and provincial government (SALGA, 2014:3-6).

In the light of the above, it is very important that SALGA (2011b:24) profiles the frequency, intensity and impact of hazards, which vary from urban to rural areas, that provides the necessary Disaster Risk Management support to local municipalities. Since, local municipalities are at the coalface of disaster risks; only the Premier of a province or the Mayor of a municipality may declare a disaster. Therefore, NDMF (2005:9), Section 1.2.1 states that the National, Provincial and Municipal DRM Centre should be located close enough for political intervention, should the need arise. Moreover, DRM as an administrative function cuts across all departments within all government spheres and therefore requires political expediency to maintain its stature as an important municipal service delivery prerogative (NDMF, 2005:9).

3.4 DISASTER RISK MANAGEMENT IN THE CITY OF CAPE TOWN METROPOLITAN MUNICIPALITY

In the discussion below, an overview of DRM in the City of Cape Town is outlined.

3.4.1 Background: City of Cape Town Metropolitan Municipality

The City of Cape Town (CoCT) has a population of 3 740 026 and is the second most-densely populated Metropolitan Municipality in South Africa. Furthermore, the City of Cape Town includes the Cape Metropolitan Council, Blaauwberg, Cape Town CBD, Helderberg, Oostenberg, South Peninsula and Tygerberg (CoCT, DRMP, 2011:4). However, the responsibility of implementing the city's Disaster Risk Management plan rests with the Head of Department for Disaster Risk Management in the City of Cape Town (CoCT DRMP, 2011:4).

This study focused on Disaster Risk Management in the CoCT; the individualised Disaster Risk Management Plans of the various Government Departments in the CoCT; The Joint Disaster Risk Reduction Management Committee of the CoCT; the Hazards that are prevalent in the CoCT; and Information Management and Communication Systems for Disaster Risk Management in the CoCT.

Figure 3.2 below depicts the CoCT, which indicates the geographical location of the CoCT in relation to the Western Cape Province showing some of its larger towns and municipalities, as referred to in the preceding paragraph.

Figure 3.2 City of Cape Town Metropolitan Municipality in the Western Cape Province

(Source: www.capetown.gov.za Accessed 2017)

The CoCT, in collaboration with the surrounding local municipalities, has developed an intensive and comprehensive Disaster Risk Management plan. The various entities within the city have been advised to develop their own individual Disaster Risk Management plans (CoCT DRMP, 2011:10-11). These individualised sectoral Disaster Risk Management (DRM) plans of the various municipalities and entities fit into the main (DRM) plan of the CoCT. Thus, when a major incident such as a flood, drought or severe storm is apparent, the Disaster Management Centre is activated and a hazard-specific task team is assigned to manage the event under the auspices of the CoCT DRM Centre. Inasmuch as the CoCT experiences many challenges during major events, their capacity to manage disaster risk is outstanding. For this reason, the CoCT has been awarded "Role-model" status by the United Nations for its extensive and elaborate workable disaster risk management plans (Bredell (2016) making Cities Resilient. Cape Town: Western Cape Government. [Online] Available: www.westerncpe.gov.za Accessed: April 2016).

3.4.2 Individualised Disaster Risk Management Plans (DRMP) in the City of Cape Town

All municipal and government departments in the CoCT are required to develop their individual disaster risk management plans in accordance with the local municipal ordinance. Whilst the overall management of disaster events resides with the CoCT's Disaster Risk Management Centre, individual directorates are required to contribute their expertise and resources should a disaster occur. An interesting phenomenon of this arrangement is that directorates must prepare hazard-specific plans according to the expertise that is within the directorates. (CoCT, DRMP, 2011:10).

According to the COCT Disaster Risk Management Plan (CoCT, DRMP, 2011:10), these individualised directorates must include in their sectoral DRM plans community education and training programmes, since communities contribute significantly to the occurrence of disasters. The broad aim of these programmes are firstly, to avoid contributing to disaster situations and secondly, to anticipate that a continued negative behaviour will lead to a disaster. The outcome of these training and development programmes is to empower communities to behave differently, for example, to build homes away from flood-prone zones or to plant more trees to prevent soil erosion. In this way, the communities and individual directorates with the relevant expertise can contribute significantly to avert disaster situations (Guzman, 2013:3-4).

The next section will address the hazard category and the number of hazard-specific sectoral plans that make up the DRMP in the CoCT.

According to the CoCT DRMP (2011:33), about 24 hazard-specific plans have been developed by individual entities, classified into six main hazard categories, which are outlined in Table 3.1 below:

Table 3.1: Hazard category in the CoCT and no of entity plans

No	Hazard category	No of entity-specific plans
1	Biological	4
2	Environmental	2
3	Geological	4
4	Hydro-meteorological	2
5	Technical	11
6	Socio-economic-political	1
	TOTAL	**24**

(Source: Researcher's own interpretation adapted from CoCT DRMP, 2011)

As indicated in Table 3.1, for each of the categories such as Biological Hazards there will be four sectoral departments that will develop their individualised sectoral plan. In the Environmental Hazard category, there are two entity or sectoral departmental plans. Each of these entities/departments will be assigned a specific responsibility such as prevention, mitigation, preparedness or response when developing their entity-specific plan. The reason for this is that they have the relevant skills for the specific roles they have been assigned. However, the responsibility to merge all these sub-plans into the main DRM plan rests with the DRM Centre of the CoCT. Even the overall management of any disaster event rests with the CoCT, as stated earlier (CoCT DRM Plan, 2011:33).

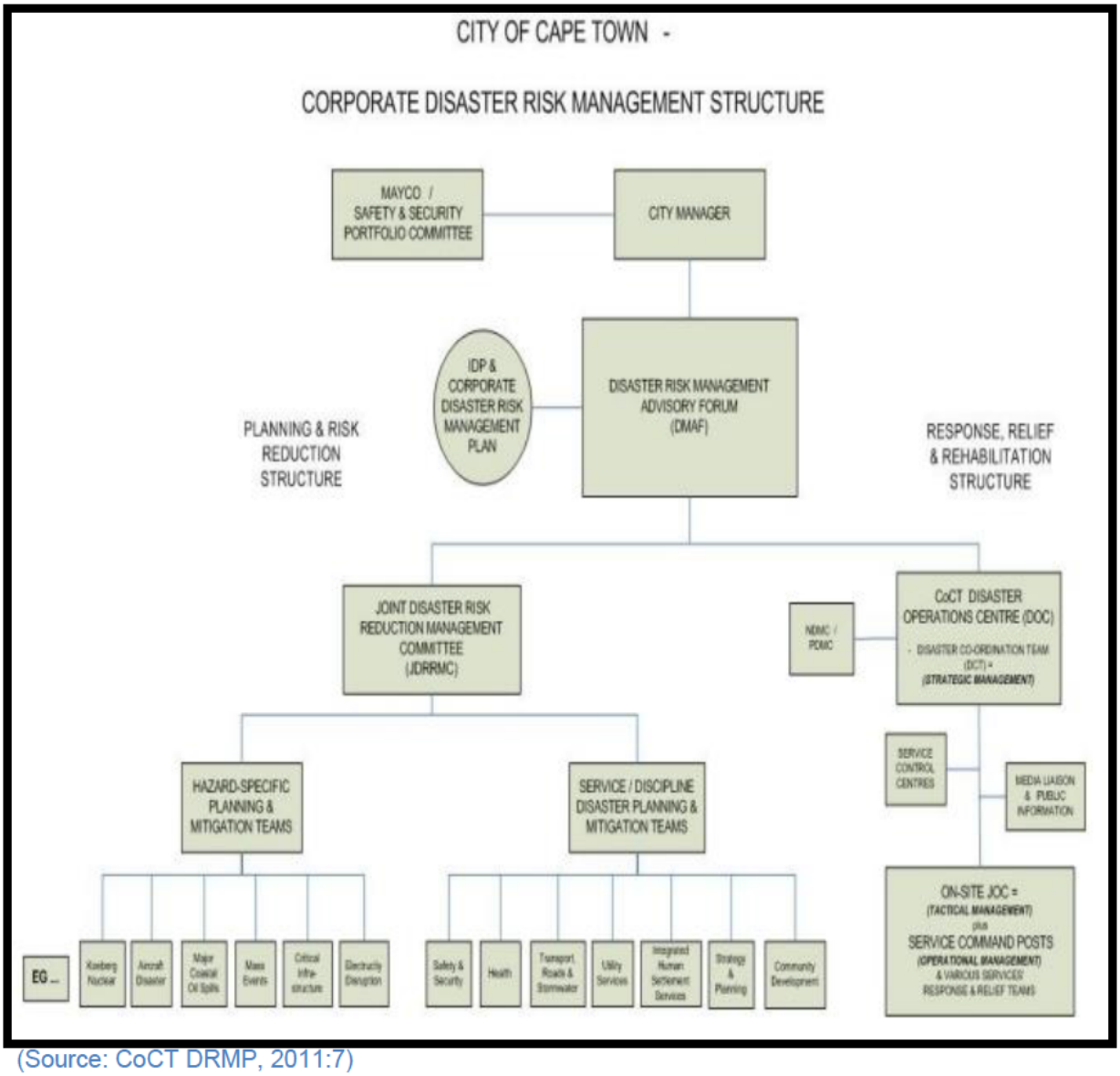
From the above discussion, it is clear that the DRM in the CoCT is a multisectoral, multidimensional and a complicated management initiative. Therefore, the CoCT DRMC stresses the importance of thorough planning and coordination. The CoCT DRMC also emphasises that all role-players (sectoral departments and volunteers) take responsibility and play their part in averting disasters. Although the CoCT is confronted by many disaster-related challenges such as floods, fires and droughts, the cooperation and support it receives from the communities and entities are commendable. For this reason, the Disaster Risk Management services in the CoCT is of a very high level (CoCT DRMP, 2011:33).

3.4.3 The corporate structure of the City of Cape Town

The CoCT has a very comprehensive Disaster Risk Management structure, as indicated by Figure 3.3 below.

This comprehensive provincial corporate, represented by 40 internal and 13 external entities, is managed by the Provincial Disaster Risk Management Advisory Forum (PDMAF). The objectives of the forum are two-fold: firstly, the coordination of risk reduction initiatives, and secondly, the response, relief and rehabilitation. What is more is that the forum has varying levels of technical and other disaster related institutional expertise. Therefore, the CoCT Disaster Risk Management Advisory Forum plays a critical role by assisting to achieve the Disaster Risk Management objectives of the CoCT (CoCT DRMP, 2011:8).

Figure 3.3 The corporate structure of the City of Cape Town Disaster Risk Management Centre



(Source: CoCT DRMP, 2011:7)

In the event of a disaster, the CoCT Disaster Risk Management Advisory Forum will operate from its disaster operations centre by a committee constituted for a specific

event. This is indicated as (CoCT Disaster Operations Centre) in Figure 3.3 above. The Joint Disaster Risk Reduction Management Committee (JDRRMC) normally oversees the hazard specific planning committee. For example, The Department of Mineral Affairs would be the specific entity that would develop a hazard plan for rock falls and landslides under the jurisdiction of the JDRRMC (CoCT DRMP, 2011:7-8).

According to the CoCT DRMP (2011:8-9), the proposed primary entity responsible for the development of disaster risk management plans, for this specific disaster category is the Department of Mineral Affairs. They have the requisite skills and the resources to be able to manage a hazardous situation such as rock falls and landslides. Therefore, they draw the plans for this specific disaster event and manage it. Table 3.2 below, indicates the broad hazard category, as geological and the disaster specific risk category is rock falls and landslides (CoCT DRMP, 2011:8-9).

The CoCT provides for an integrated and well-coordinated Disaster Risk Management service, since it involves all spheres of Government and includes many internal and external stakeholders. Moreover, in its line of communication, the CoCT Disaster Risk Management Centre communicates with the Provincial Disaster Risk Management Centre, which in turn liaises with the National Disaster Risk Management Centre as required by the Intergovernmental Relations Act (CoCT DRMP, 2011:8-9).

3.4.4 The Joint Disaster Risk Reduction Management Committee (JDRRMC)

According to CoCT (DRMP 2011:10-11) the JDRRMC**,** comprises specific senior management members from 40 internal service departments and 13 external organisations. They are the interface between the CoCT Provincial Disaster Risk Management Advisory Forum (PDMAF) on the one hand and the hazard specific planning and the mitigation teams, on the other.

Hence, it is the responsibility of the provincial Disaster Risk Management Advisory Forum to ensure that the hazard-specific task teams and service departments meet regularly to address priority disaster risks, such as nuclear emergencies, flooding, climate change, earthquakes and hazardous materials incidents, amongst others. Regular meetings will ensure that the CoCT is on alert and prepared for any hazard-specific emergencies at all times. This well-coordinated, multisectoral approach is

commendable, since many entities are involved in the management of disaster risks in the CoCT (CoCT DRMP, 2011:10-11).

Because of this multisectoral, multilevel approach, disaster risk management, which was once the domain of the engineering community, may now be entertained simultaneously by the industrial as well as the finance sectors. Other sectors with specific skills may also be involved, which brings about a new dimension to disaster risk management. In order to have a clear understanding of different perspectives, one needs to be creative and involve as many sectors as possible. In this way, “disaster risk management becomes everybody’s business” and this approach will ensure a reasonable amount of success in the DRM arena (Guzman, 2013:1).

3.4.5 Hazard category and departments responsible

Table 3.2 below provides a comprehensive list of the Hazard Category, the Disaster Risk Category and the entity responsible for this function in the CoCT, Disaster Risk Management Centre.

The first Column in Table 3.2 indicates the following Hazard Categories in the CoCT: Meteorological, Hydro Meteorological, Geological, Biological, Environmental and Technological. These hazards pose the following types of risks as indicated in Table 3.2, Climate-Related, Meteorological Drought, Seismic Risks and Earthquakes, Installation Risks and Transport Risks. Table 3.2 indicates the specific department that is responsible for the developing individualised disaster risk reduction plans within their area of competence.

Table 3.2: Department Responsible for the Hazard and Risk Category

Hazard Category	Disaster Risk Category	Proposed Entity
Meteorological	**Climate Related:**	Department of Water Affairs and Forestry
	Extreme Weather	Department of Water Affairs and Forestry
	Meteorological drought	Department of Agriculture
Hydro-meteorological	Hydrological:	Department of Water Affairs and Forestry
	Flooding (Rivers)	Department of Water Affairs and Forestry
	Coastal flooding and Storm Surges	Department of Water Affairs and Forestry
	Urban Flooding	Department of Water Affairs and Forestry
	Droughts	Department of Agriculture
Geological	**Seismic risks and Earthquakes**	**Department of Mineral Affairs**
	Rock falls and landslides	Department of Mineral Affairs
	Fires: Urban fringe fires	Department of Provincial and Local Government
	Veld fires	Department of Water Affairs and Forestry
Biological	Epidemics	**Department of Health**
	Human	Department of Health
	Livestock	Department of Agriculture
Environmental	Air Pollution	**Department of Environmental Affairs and Tourism**
	Water Pollution	**Department of Environmental Affairs and Tourism**
	Soil Erosion and Land Degradation	**Department of Environmental Affairs and Tourism**
Technological	**Installation Risks**	**Primary Department /Entity**
	Power Plants	
	Bridges	
	Dams	
	Petrochemical Installations	
	Transport Risks	**Department of Transport/ Environmental Affairs**
	Sea/Air/Rail/Road	
	Hazmats	
	Marine Oil Spills	
	Toxic Cargo Spills	
	Radio Activity Emissions	

(Source: Western Cape Provincial Gazette 6455, 2011:22)

Thus, the *Western Cape Provincial Gazette* 6455 (2011:22), provides for departments and entities to take responsibility for and develop their DRMP within their area of disaster risk-related competence. For this reason, the most common hazards have been listed in Table 3.2 above and the entity or department responsible for managing that specific hazard is indicated. These entities and/or departments, listed in Table 3.2, must plan for and manage hazard events under the supervision of the Joint Disaster Risk Reduction Management Committee from the CoCT's Disaster Risk Management Centre (CoCT DRMP, 2011:10-11).

3.4.6 Disaster Risk Assessment: Hazards prevalent in the City of Cape Town

Disaster Risk Assessment is the process by which potential hazards are analysed and evaluated according to the existing conditions of vulnerability. The reason for the risk assessment is to establish to what extent people and property could be harmed from a potential threat (The Namibian Disaster Risk Management Plan, 2011:63).

In this regard, a consultant (Aurecon) conducted the disaster risk assessment for the CoCT. This was in in compliance with the DMA (2002), as well as the NDMF (2005) using both technical as well as community based expertise. Under these circumstances, Table 3.3 below provides a brief summary of the findings of a citywide Disaster Risk Assessment conducted during 2009/10 (CoCT DRMP, 2011:26).

Table 3.3 below shows the Hazard type that is present in the CoCT with the probability of occurrence and the vulnerability ratings.

Table 3.3: Hazard type, probability of occurrence and vulnerability ratings disaster

Hazard type	Probability of occurrence	Vulnerability rating
14 Hydro-meteorological Hazards	Very high probability of five Hazards occurring	Two of these disasters make the community and property extremely vulnerable
6 Biological Hazards	Normal probability of four Hazards occurring	One biological hazard makes people and property extremely vulnerable
23 Geological Hazards	Very high probability of one Hazards occurring	Seven geological hazards make people and property extremely vulnerable
18 Technological Hazards	Very high probability of three Hazards occurring	Five Technological hazards make people and property extremely vulnerable
4 Socio-economic-political Hazards	Very high probability of two Hazards occurring	None of the Socio-economic-political hazards will make people and property (moderately) vulnerable
16 Environmental Hazards	Very high probability of five Hazards occurring	Six Environmental Hazards will make people and property moderately vulnerable

(Source: CoCT DRMP, 2011:10)

Table 3.3 above provides a summary of the risk assessment conducted for the CoCT, available in the CoCT DRMP (2011:10). From Table 3.3, it may be concluded that there are many issues for consideration such as only five of the 14 Hydro-meteorological hazards are predicted to affect the CoCT. Another consideration is that there is a high probability of the five hazards occurring with a very low impact; however, if two of these events do occur, the impact may be severe, because these two hazards make the communities and property extremely vulnerable. Therefore, one could argue that Disaster Risk Management officials must plan for the magnitude and severity of at least two hydro-meteorological disasters for the CoCT (CoCT DRMP, 2011:30).

Another issue for consideration is that there are four socio-economic and political hazards predicted to affect the CoCT with a very probability of two hazards actually occurring. However, neither communities nor property is vulnerable. For this reason, one may argue that it will be safe to plan and prepare for at least one of these events.

For these reasons, it is important for the PDMAF to meet regularly with the task teams and sectoral departments to discuss priority risks, their impact and vulnerabilities so that all officials entrusted with specific hazard risk management are adequately prepared for any eventuality (CoCT DRMP, 2011:30).

According to the CSIR Report (2005:16-17), climate change and its resultant changing weather patterns caused an increase in damaging floods in the Western Cape during 2003 and 2005. These storms are caused by unusual weather phenomena called “cut-off lows”, which is accompanied by gale-force winds and very heavy rainfall within a short space of time. Thus, climate change has also added to the number of hazards affecting the CoCT, raising the financial burden especially on poorer communities. For these reasons, there is a need to reprioritise and reduce the number of hazards in the CoCT. In this way, resources could be used more effectively (CSIR, 2005:16-17).

3.4.7 Information management and communication systems

In the management of disasters, one of the most important resources is communication. Communicating effectively refers to sending the right amount of information to the right audience at the right time (RSA, 2012:15). This is more important, especially during the management of disasters if the lead-time required to responding to disasters is reduced to a minimum. If more lives and property are saved in the process, communication is said to be effective (RSA, 2012:15).

According to the Department of Agriculture, Forestry and Fisheries (DAFF), there are insufficient information management systems to manage disasters in South Africa effectively. Notwithstanding this critical shortage of effective information management systems, the quantity and quality of disaster risk forecasts (EWS) have improved tremendously in South Africa. However, the application of these measures is very poor (RSA, 2012:15).

In this regard, the CoCT DRM Centre has adequate information technology infrastructure, information management systems and an effective direct emergency call centre to ensure immediate reporting to and from the CoCT DRM Centre. This call centre is known as the Public Emergency Communications Centre (PECC) with an

emergency call number 107, which functions under the auspices of the CoCT DRM Centre.

The PECC has the most advanced radio-trunking communication system in South Africa, which is being upgraded to ensure maximum effectiveness and full functionality on a continual basis. For this reason, more support staff and agreements are required to avert malfunctioning or sabotage. In addition, the establishment of a Radio Network Control Centre is also being investigated as a backup by the CoCT for maximum real-time communication in the event of a disaster (CoCT DRMP, 2011:14).

3.4.8 Summary of Disaster Risk Management in the City of Cape Town Metropolitan Municipality

The head of the CoCT DRM Centre, with the support of the Executive Mayor of the CoCT, have secured that all CoCT DRM Advisory Committee Meetings precede the Mayoral Committee Meetings. Since political support has been secured, attendance to DRM meetings by sectoral departments and community-based organisations have improved tremendously.

In the CoCT, DRM hazard-specific sectoral plans developed by departments dovetails into the main CoCT DRM Plan. When any category of disaster occurs, the disaster operation centre is activated. A disaster-specific task team is assembled and assigned specific roles and responsibilities in accordance with their sectoral plans. Thus, disaster-specific teams are dispatched for search, rescue and rehabilitation efforts. In this way, the entire DRM operations are well coordinated and death and destruction are minimised.

In its efforts to keep the communities informed in real time and to avoid the initial chaos that precedes search and rescue efforts, the CoCT DRM Centre has established a very effective communication system to keep the community and other stakeholders abreast of the latest developments during DRM operations (CoCT DRMP, 2011:14). This effective communication is also continuously upgraded to counter even sabotage efforts (CoCT DRMP, 2011:14).

Furthermore, the CoCT DRM Centre makes provision for a well-established register of volunteers who regularly attend extensive DRM training programmes. These volunteers are assembled very quickly when time is of the essence to attend to search-and-rescue operations and to advance the quality of DRM services in the CoCT.

From the above discussion, one could argue that the CoCT renders effective Disaster Risk Management services. Its structure is strengthened by the adequate support it receives from politicians, sectoral departments and the communities to manage DRM services effectively. The high quality of DRM services provided by the CoCT Disaster Risk Management Centre may be attributed to the political support it receives from the Mayoral Committee, since every DRM Advisory Committee meeting precedes the Mayoral Committee meetings. Thus, for its extensive and elaborate workable disaster risk management efforts, the CoCT was awarded “Role-model” status by the United Nations.

3.5 DISASTER RISK MANAGEMENT IN THE CITY OF EKURHULENI METROPOLITAN MUNICIPALITY (EMM)

In the discussion below an overview of DRM in the Ekurhuleni Metropolitan Municipality is provided.

3.5.1 Background: Ekurhuleni Metropolitan Municipality

The Ekurhuleni Metropolitan Municipality (EMM) is situated in Gauteng Province, with a population of 3 178 470. It comprises 9 towns, 17 townships and 8 000 industries, as indicated in Figure 3.4 below. In general, manufacturing, finance and business constitutes about 23% of its economy, trade 15%, transport 11%, construction about 5% and mining 2% product (EMM DMP, 2015:5).

Figure 3.4: The various towns that make up the Ekurhuleni Metropolitan Municipality

(Source: EMM DMP, 2015:16)

According to the EMMDM Plan (2015:5), the EMM has a vast network of railway lines, roads, telephones, electricity grids and airports, making it competitive with of European and American plans. In addition, the EMM contributes about 25% of Gauteng's economy and about a third of South Africa's gross domestic product. South Africa's largest railway hub, with the most modern road networks, and infrastructure developments surrounds the OR Tambo International Airport, which connects it to most parts of the world. The OR Tambo International Airport is also situated within towns such as Boksburg, Kempton Park and Benoni. It is larger and more diverse than some smaller countries in Africa, and it is the only aerotropolis in Africa. For these reasons, one may argue that the EMM is vulnerable to both natural as well as man-made disasters and therefore was selected to form part of this study.

3.5.2 Ekurhuleni Disaster Risk Management Centre (EDRMC)

The Ekurhuleni Disaster Risk Management Centre (EDRMC) developed its Disaster Risk Management Plan (DRMP) for the period 2015 to 2018 in compliance with the following legislations and frameworks, pertaining to Disaster Risk Management:

- The Constitution (1996);
- The DMA (2002);
- The NDMF (2005); and
- The MSA (2000).

The EMM, DMP of 2015 to 2018 (2015:16) states that the disaster risk-reduction strategy of the Ekurhuleni Metropolitan Municipality is of an internationally acceptable standard. The reason for this is that the EDRMC has aligned its DRM plan to the United Nations International Strategy for Disaster Risk Reduction (UNISDR, 2004) via The Hyogo Framework for Action (HFA) (2005) and the Africa Regional Strategy for Disaster. The vast rail and road networks, its dense population, involved in a hive of economic, activity make it vulnerable to both natural and manmade disasters as indicated earlier.

The EMM is an aerotropolis, which further exposes it to many types of disasters. For all these reasons, it is imperative that this municipality reduces its disaster risks. In this regard, the EMM complies with international and regional legislation such as The Hyogo Framework of Action (2005), The Sendai Framework (SF) (2015) and The Africa Regional Strategy for Disaster Risk Reduction (ARSDRR). These international initiatives are aimed at meeting local objectives in reducing disaster risks (EMMDM Plan, 2015:15).

3.5.3 Challenges faced by the Ekurhuleni Disaster Risk Management Centre (EDMC)

According to the Head of the EDMC, three important challenges confront the EDMC. The first is to develop a multi-stakeholder, sector-specific DRM plan, using a developmental approach, so that all stakeholders are gradually brought on board. Secondly, for sustainable development initiatives to be successful, all stakeholders

must be involved in disaster response and mitigation measures. Thirdly, there is a lack of awareness of disaster risks and communities need to be trained in disaster risk reduction actions and preparedness (15 March 2016, Mazibuko).

In this regard, the EMM DRMP is divided into two distinct phases. The first is the pre-disaster risk-reduction phase, consisting of mitigation and preparedness measures. The second is the post-disaster recovery phase, which consists of relief, rehabilitation and reconstruction measures. Moreover, the various government departments are expected to contribute to the DRMP, either in a pre- or post-DRR phase, as identified by a needs analysis (EMM DRMP, 2015:12).

The corporate Disaster Risk Management plan (EMM DRM of 2015:14) dictates the specific areas in which departments are required to support. Using the corporate plan, a generic DRR plan must be developed after considering the risk specific conditions and special circumstances that are prevalent in the municipality. Therefore, the corporate Disaster Risk Management plan, which considers the standard operating procedures (SOP) or the parameters within which departments must function, directs the departments to develop their DRM plans in specific areas. This is to ensure that DRR efforts are effective (EMM DRM, 2015:15).

3.5.4 Stakeholder consultative process in the Ekurhuleni Metropolitan Municipality

The EDMC has been involved in a very exhaustive campaign to involve all stakeholders to develop its Disaster Risk Management plan. For this purpose, SRK Consulting, an independent, internationally recognised consultancy firm, developed the Disaster Risk Management plans for the EDMC. The SRK consultants used advanced technological tools such as Geographic Information Systems (GIS), Global Positioning Systems (GPS) and remote sensing instruments to include preparedness, response, recovery and mitigation efforts into their plans. SRK Consulting also identified point-specific and “real-time” locations for rapid-onset disasters and included Community-Based Disaster Risk Reduction Strategies into their DRMP. This was done by engaging with the communities, conducting vulnerability assessments and integrating the recommended strategies into their DRMP (EMM DRMP, 2015:17).

SRK Consulting also made use of a questionnaire that was circulated amongst its internal stakeholders to understand the hazards that are prevalent in the Ekurhuleni Metropolitan Municipality (EMM) better. In addition, a platform for community participation was created where the public was requested to go on to the website and provide information regarding the hazards prevalent in the municipality. The information gathered via this platform and the questionnaire were integrated into the EMM DMP developed by SRK Consulting (EMM DMP, 2015:17).

In the light of the above discussion, one could argue that the Disaster Risk Management Plan of the Ekurhuleni Metropolitan Municipality is one of the most comprehensive and widely accepted plans in South Africa (EMM DMP, 2015:18). The EMM DMP is in line with the requirements of the Sendai Framework for Disaster Risk Reduction (2015:6) which argues that:

> The HFA has been an important instrument for raising public and institutional awareness, generating political commitment, focusing and catalysing actions by a wide range of stakeholders at all levels.

The reason for creating widespread DRR awareness both locally and internationally is to ensure that people at all levels become conscious of the need to reduce disaster risks. What is more important in this regard is that the Sendai Framework has been developed to provide concrete actions to reduce disaster risks visibly. Since the EMM EDRM Plan has gone through such a rigorous consultative process. It may be argued that it is one of the most accepted municipal plans in South Africa (EMM DMP, 2015:18).

3.5.5 Ekurhuleni Metropolitan Municipality Organisational Structure and Succession Plan

Similar to the operations in the CoCT Metropolitan Municipality, the EMM Council has delegated the ultimate DRM responsibility to its executive Mayor. However, the day-to-day operations are vested with the Head of the Disaster Management Centre, Director of the Emergency Services and Chief of Police.

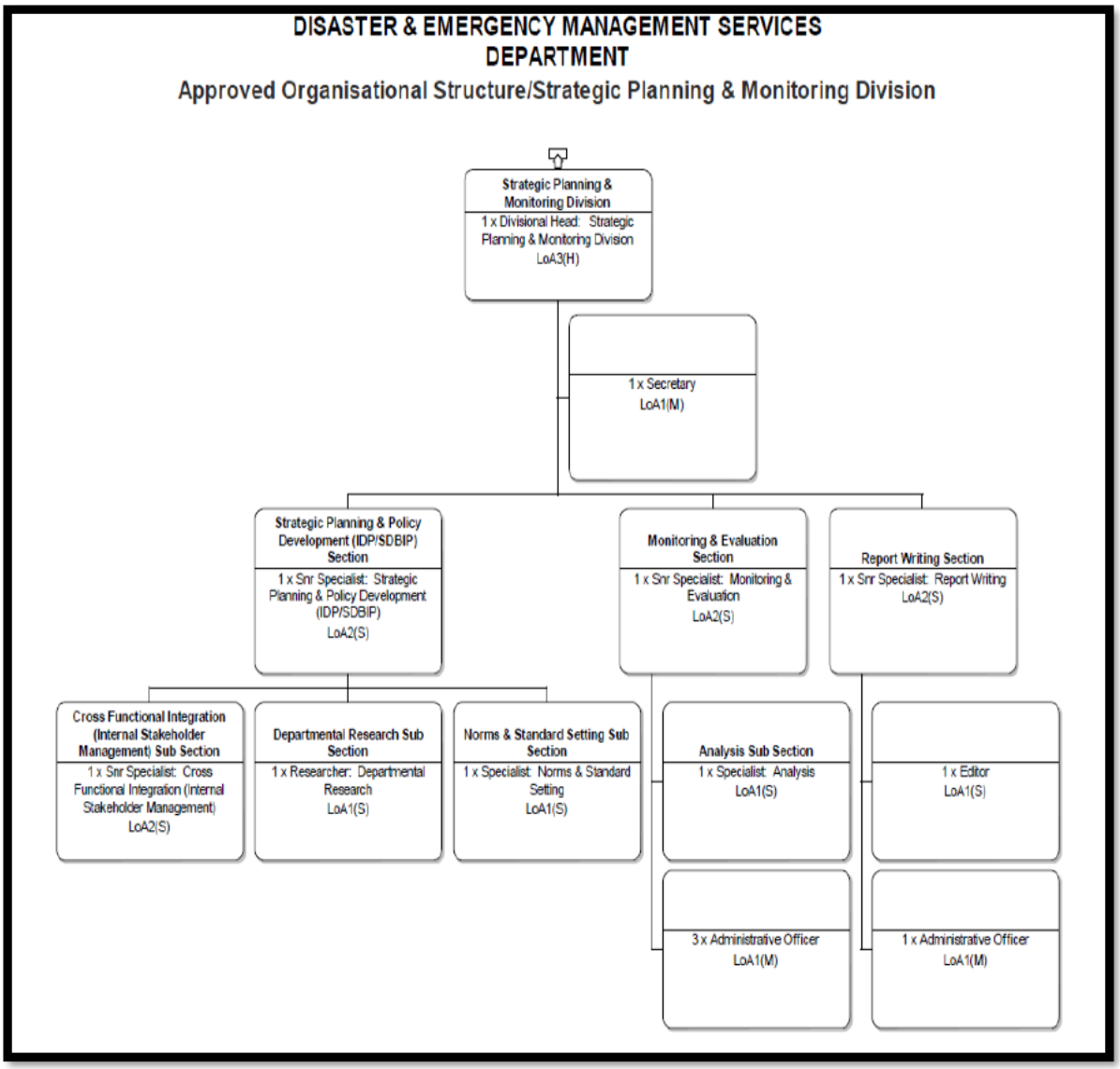
3.5.5.1 Succession plan

The EDMC has resolved to allow for succession planning in the execution of Its Disaster Risk Management functions. Officials of the EDMC may be injured on duty or ill or absent for whatever reasons. Therefore, in the absence of the Mayor, the City Manager or the Head of the DRMC, the respective deputy will act in the said position, leaving no time delays in the decision making (EMM DMP, 2015:18).

3.5.5.2 Ekurhuleni Metropolitan Municipality. Disaster Management Centre (EMM DMC) – organisational structure.

Figure 3.5 below shows the structure of the disaster and emergency management services of the Ekurhuleni Metropolitan Municipality.

Figure 3.5 EDRMC organisational structure



(Source: EDRM Plan, 2015:18)

3.5.6 Hazard analysis in the Ekurhuleni Metropolitan Municipality

As indicated in the stakeholder consultative process, an external consultant (SRK Consulting) was involved in the hazard analysis process using scientific methodology. In addition, there was a comprehensive internal and external stakeholder consultative process including a web-based forum. All of this information resulted in the compilation of the hazards as outlined below.

Table 3.4: Natural and technological hazards (Ekurhuleni Metropolitan Municipality)

Natural Hazards	Informal Settlements	Technological Hazards
Lightning strikes causing fires and damages	Floods – especially close to or affecting informal settlements	Hazardous material spills and accidents (roads, rail and air)
Damage to Power lines	Heatwave	Mine tremors
Residential Fires	Extreme cold	Major accidents (especially along the N1, N3, N12, N17, R24 and R21)
Veld fires	Fires in informal settlements	Petronet pipelines
Commercial and industrial buildings fires	Subsidence in dolomite areas settlements	Aircraft crashes (Johannesburg International Airport and Rand Airport)
	Strong winds and tornadoes	Explosion – e.g. African Explosives Limited (AEL) Sasol Gas pipeline leaks and explosions
	Earthquakes	Rail accidents and derailments
	Thunderstorms	
	Health-related disasters	

(Source: Adapted from EMM, DMP, 2015:23)

According to EMM DMP (2015:23), Disaster Risk Management plans focus on the most vulnerable communities living in informal settlements, which is indicated in the middle column in Table 3.4 above. Some of the most serious hazards affecting the communities in informal settlements are floods, heatwaves, extreme cold, earth tremors and strong winds. Technological hazards that pose a threat to communities in informal settlement includes gas explosions and hazardous material spillages. The EMM has also made arrangements concerning commercial and industrial fires in its DMP, as reflected in the Hazard Analysis Table 3.4 above. The communities affected by the hazards indicated in Table 3.4 above are no different to many other communities that live on the outskirts of major cities in South Africa and by virtue of living in low-cost informal houses they are already vulnerable to many of the hazards such as heatwaves, extreme cold and floods.

The following vulnerabilities were also identified: residents living in unsafe areas, dolomite mine dumps along major road and rail corridors, residents in informal settlements close to hazards (i.e. gas and fuel pipelines and overhead electrical wires);

and residents not trained in disaster risk-reduction activities and lack of awareness of disaster risks. The EDMC with its various directorates and departments have developed 17 Disaster Risk Management sub-plans including a comprehensive corporate Disaster Risk Management plan. Moreover, the following departments and/or entities are responsible for the development of the sub-plans.

Table 3.5. Entities and departments responsible for development of sub-plans

Entity/Department	**Entity/Department**	**Entity/Department**
Corporate legal services	Housing	City Development
Water and sanitation	Finance	Environmental Resource Management
Roads and Storm water	ICT	Economic Development
Energy and Electricity	Internal Audit	Customer Relations Management
Waste Management	South African Weather Services	South African Red Cross
Public Transport Housing	Communication	SPCA
Salvation Army	South African National Defence Force (SANDF)	South African Police Services (SAPS)
City of Tshwane	City of Johannesburg	South African Council of Churches (SACC) and other faith-based organisations

(Source: EMM, DMP, 2015:24)

The above-mentioned departments and entities are responsible for the development of sub plans such as Major/minor Incident plan, civil strife plan, ICT disaster-recovery plan, Departmental All-Hazard plan, Human Settlement plan, Airport plans, Municipal building Emergency plans, Assisting the Care Centres' plans, International Standards Guide plans and Incident Management System plan. These sub-plans are forwarded to the EDMC where they are merged to form a comprehensive corporate disaster management plan for the entire EMM (EMM DMP, 2015:24).

The composite corporate DMP of the EMM is then submitted it for inclusion into the IDP of the EMM. Included in the corporate plan is the primary and secondary roles and responsibilities of each of the listed departments as indicated in Table 3.5 above. The reasons for this is to assign roles and responsibilities to each entity and/or department.

In addition to Table 3.5 above, the EMM also has the following departments that also have specific responsibilities as indicated below:

- **Corporate Legal Services:** Responsible for the management of council properties;
- **Water and Sanitation:** Responsible for Prioritisation of restoration of disrupted water supplies;
- **Human Resource**: Responsible for the maintenance of records received on specialist skills and qualifications acquired by municipal employees in accordance with the identified needed categories determined by the Disaster Management Centre; and
- **Metro Police**: Maintenance of law and order in terms of relevant legislation. Coordinate access control to a disaster area (EMM DMP, 2015: 17-53).

Just as all departments and entities in the EMM are responsible for developing their sub-plans, the entities have also been assigned specific additional roles as indicated above.

3.5.7 Testing and reviewing of Disaster Risk Management Plans

Since all DMP are public documents, they are available for inspection and comment at the Metropolitan Municipal Centre. Therefore, the EMM is of the firm belief that the DRM plans must be regularly tested and reviewed. EMM uses a variety of methods such as meetings/discussions, paper exercises, hazard-specific exercises, stakeholder-specific exercises, regional exercises and full-scale simulation activities to review and update its plans continuously. The reason cited for this is that DRM officials must be prepared to attend to any disaster situations and at any time (EMM DMP, 2013:58-59).

3.5.8 Spatial Development Framework

In addition to the DMP, the City Development Department's Spatial Planning Directorate has produced a spatial development framework for the future development of the municipality. According to the Municipal Spatial Development Framework (MSDF) Report 2 (2011:11-15), some of the policy issues included in the MSDF Report

2 are environmental issues influencing disaster risk management, spatial development and growth management strategy, urban planning, capital investment and land use planning (MSDF Report 2, 2011:11-15).

3.5.9 Summary of Disaster Risk Management in the Ekurhuleni Metropolitan Municipality

The Ekurhuleni Disaster Risk Management Centre (EDRMC) developed its Disaster Management Plan (DMP) using the *Constitution* (1996); the DMA (2002); the NDMF (2005) and the MSA (2000). The EDMC has also aligned its DMP to the United Nations International Strategy for Disaster Risk Reduction (UNISDR, 1999) and the Hyogo Framework for Action (HFA, 2005:15).

In carrying out its DRM mandate, the EDMC has adopted a contingency plan that allows for the delegation of specific roles and responsibilities for officials who may be injured on duty, who may be on leave, or who may retire. This allows for critical decision-making for when the designated authority is not available. The EDMC has resolved to allow for contingency planning in the execution of its DRM functions when designated officials of the EDMC are not available.

Furthermore, in developing its comprehensive corporate DRM plan, the EMM has consulted widely using questionnaires as well as web-based platforms to include inputs from the communities in the development of their DRM Plans. This is in addition to the SRK Consulting firm that used scientific methods to develop their DRM Plan.

In developing the Disaster Risk Management Plan, a wide consultative process was involved, involving DRM experts as well as other stakeholders. Furthermore, it has more than 17 different sub-plans all merging into a comprehensive corporate Disaster Risk Management Plan for the Ekurhuleni Metropolitan Municipality. The testing and reviewing of Disaster Risk Management Plans as well as training and development of disaster risk management officials adds significant value to the EMM, DMP. For this reason, the Ekurhuleni Metropolitan Municipality Disaster Management Centre functions at level 3, which is one of the best-functioning municipalities regarding Disaster Risk Management in South Africa.

Section 3.4 and 3.5 above focussed on the governance and administration of disaster-risk management services in the City of Cape Town metropolitan municipality and the Ekurhuleni metropolitan municipality. The next section discusses disaster-risk management services in the Mangaung metropolitan municipality.

3.6 THE MANGAUNG METROPOLITAN MUNICIPALITY (MMM): STRUCTURE AND COMPOSITION

In the discussion below, an overview of DRM in the Mangaung Metropolitan Municipality is provided.

3.6.1 Background: Mangaung Metropolitan Municipality (MMM)

The Mangaung Metropolitan Municipality is the administrative capital of the province because of its population size, huge geographical area covering 6 863 Km^2, economic activity and infrastructure development (MMM DMP, 2016:16). The MMM comprises three highly urbanised areas, namely Bloemfontein, Botshabelo and Thaba Nchu, surrounded by a massive rural area.

The City of Bloemfontein is the legislative and administrative centre of the Free State Province with a population of about 52% of the MMM; Botshabelo to the east of Bloemfontein has a population of about 28% and is about 55 kilometres away from Bloemfontein. Thaba Nchu is situated about 12 kilometres to the east of Botshabelo and about 67 Kilometres away from Bloemfontein, with a population of 14%. The remaining rural area is home to 6% of the metropolitan population (MMM DMP, 2016:6).

Overall, Bloemfontein has a mixed economy with two large shopping malls and three industrial areas. Botshabelo and Thaba Nchu, on the other hand, have a very limited range of commercial activities, including 138 factories, an industrial park and other smaller infrastructure development (MMM DMP, 2016:6).

In addition, the MMM is facing severe challenges regarding service delivery. This is compounded by high levels of unemployment, poverty and inequality. According to the MMM DMP (2016:12), about 50% of the population of the MMM earn less than R1 000 per month. Thus, the municipal basic services backlog for water is at 8.7%, sanitation

at 6.9% 15% roads and storm water flows at 26%. Due to a great shortage of housing, informal settlements are on the increase and currently there are 45 informal settlements in and around Bloemfontein. Whilst municipal finances are used for much-needed basic services, the maintenance of infrastructure such as roads, bridges and dams are neglected. However, according to a service-delivery survey conducted by Ask Afrika Orange Index with 9 000 countrywide customers, the MMM seems to be doing reasonably well in basic municipal service delivery (MMM DMP, 2016:7).

3.6.2 Mangaung Metropolitan Municipality's vulnerability

The significance of the above discussion is to indicate how vulnerable the Mangaung Metropolitan Municipality is to earthquakes and other disasters. The Lejweleputswa District, which is a mining district, is prone to tremors and earthquakes. Merriespruit, Virginia, Welkom and Allanridge, which are located within the Lejweleputswa District, are earthquake-prone towns, neighbouring the Mangaung Metropolitan Municipality. If a measurement of five and above is registered on the Richter scale and if the epicentre of the earthquake is close enough to Bloemfontein, the devastation to the population and critical infrastructure could be catastrophic, even to the Mangaung Metropolitan Municipality (MMM DMP, 2016:21).

The reason for this assumption is that on 5 August 2014, an earthquake measuring 4,9 on the Richter scale struck Orkney, a small mining town in the North-West Province (278 km away from Bloemfontein). Although this earthquake was about 5 km deep, it was felt as far away as Durban (630 km away from Orkney) and Botswana, which is 551 km away from Orkney (Kijko, 2014:2).

In view of the above, the MMM Disaster Risk Management Centre must be on high alert in terms of preparedness programmes for earthquake disasters that may emanate from the closer-lying Lejweleputswa District Municipality area. The impact of a disaster measuring 5 on the Richter scale may devastate communities and critical infrastructure within the Mangaung Metropolitan Municipality.

The MMM is vulnerable to earthquake disasters, since it is situated close to a disaster-prone area. Firstly, the town of Ritchie in the Northern Province lies in a southwesterly direction, about 188 kilometres away from Bloemfontein. Secondly, to the southeast,

lies the town of Nako in Maseru, Lesotho, which is about 45 kilometres away. Thirdly, in a northwesterly direction lies the town of Welkom, which is about 165 kilometres away. Ritchie and Welkom have experienced many earthquakes in the past two years and Nako has experienced its last earthquake 15 years ago (Kijko, 2014:2).

3.6.3 The Mangaung Metropolitan Municipality Disaster Management Plan (MMM DMP)

The Mangaung Metropolitan Municipality Disaster Management Plan (MMM DMP) outlines DRM in South Africa, which was reactive, post-disaster and mainly dealing with the consequences of disasters. Civil Defence Organisations were introduced to prepare contingency plans to respond to human-induced disasters and to ensure the safety of communities. Much later, the concept of civil defence was introduced to cater for natural disasters and disaster-related community preparedness. Consequently, over the past 20 years, a new integrated management approach to the management of disasters called “Disaster Management” emerged. In this respect, the MMM DRMP is an important component of the municipality’s IDP. However, the name of the MMM Disaster Management plan does not include risk in its title, which should be Mangaung Disaster Risk Management rather that the current, Mangaung Disaster Management Plan (Mangaung DM Plan, 2016:8).

The MMM DMP emphasises that all developmental measures are compliant with the principles of prevention and mitigation, which in essence means that the municipality must be prepared at all times for any disastrous eventuality (Mangaung DM Plan 2016:18). According to the MMM DMP (2016:18), an extensive list of twelve legislative frameworks were consulted to develop the plan. Amongst these, the most prominent were the following:

- The Constitution (1996);
- The MSA (2000);
- The FBA (1987;
- The NVFFA (1998)
- The NEMA (1998).

The MMM is the only metropolitan municipality (of the three metropolitan municipalities of this study), that makes reference to such an extensive list of legislation. If the development of the MMM DMP is guided by the Acts listed above, then one may argue that the plans are comprehensive (MMM DMP, 2016:8).

The MMM DMP and the other two metropolitans' DMPs involved in this study define the most common concepts of disaster risk management such as disaster, disaster management, vulnerability, disaster mitigation and disaster response, amongst others. However, the MMM DMP does not define or refer to Disaster Risk Management, which is the most recent internationally accepted concept, nor does it include the word "risk" in the title of its DMP, as emphasised by the Sendai Framework (Sendai Framework, 2016:15).

The MMM DMP has incorporated an extensive set of annexures comprising a risk and vulnerability analysis, the departmental DMPs and a regional DMP for Botshabelo and Thaba Nchu. The vulnerability atlas is a set of assets such as natural assets, economic assets, structural assets, capital assets and physical assets, which are listed in a register. These assets refer to communities at risk and infrastructure, such as the economy that may be damaged or destroyed if effective mitigation measures are not in place to protect them. Departmental plans refer to DRMPs developed by government departments in which they have the necessary expertise. The reason government departments develop individual DRMPs is that these departments should have the necessary expertise in Standard Operating Procedures (SOPs). Consequently, a regional DRMP has been developed for Thaba Nchu and Botshabelo, as the communities in that area are prone to the adverse effects of poverty. In addition, about 138 factories in that area could be affected in the case of a disaster striking the area (MMM DMP, 2016:13).

3.6.4 Objectives of the Mangaung Metropolitan Municipality's Disaster Management Plan

The MMM DMP is an integral part of the Integrated Development Plan (IDP), which is a key requirement of the MSA (2000). For this reason, the MMM Disaster Management Plan has outlined a comprehensive set of objectives, which are:

- To establish a disaster management framework for the municipality as per legislative framework;
- To define priority objectives;
- To identify and address challenges to manage disaster risks;
- To set the corporate structure and institutional arrangements for the Management of disasters; and
- To set the key requirements for the effective functioning of the Disaster Risk Management Centre (MMM DMP, 2016:14).

3.6.5 The Mangaung Metropolitan Municipality's Disaster Management Structure

The MMM established the following structure in order to achieve the Disaster Management objectives in its DMP.

According to the Mangaung Metropolitan Municipality Disaster Risk Management Framework, the MMM Council is the custodian of the Metropolitan Municipality's Disaster Risk Management Centre (MMDRMC). The executive authority is the Executive Mayor and the operational manager is the Metropolitan Municipal Manager. The head of the MMDRMC is the functional manager, who is responsible for the day-to-day operations of the DMC. The management of disasters, is the responsibility of the Executive council which is composed of members of the Transport, Security and Emergency Cluster in the Free State Province, the MMMDRMC officials and the members from the MMM Disaster Risk Management Advisory Forum (Mangaung Metropolitan Disaster Risk Management Policy Framework, 2015:8).

The head of the MMM DRMC, the heads of the various municipal departments and some of the DRM officials constitute the Internal Disaster Risk Management Committee (IDRMC) for the MMM. The responsibility of the IDRMC for the MMM is critical, since it promotes interdepartmental relations and effective coordination of disaster-related services within its functional area. Furthermore, the IDRMC for the MMM meets at least four times a year and more often, if necessary (Mangaung Disaster Risk Management Policy Framework, 2015:9).

All municipal departments are required to develop their individualised disaster risk management plan. Although these individual departmental plans are annexures to the

MMMs composite plan, they are nevertheless integrated. In the case of a major incident or a disaster in the region, an event-specific response team would be dispatched from the various government departments. These event-specific response teams such as a response team for chemical spillage or urban fires who have specific expertise in this area and, will have to work according to specific standard operating procedures (SOP) (MMM DMP, 2016:16).

The main departmental role- players are The South African Weather Services, The Department of Water Affairs and Forestry, The Department of Agriculture and the Department of Health for the Mangaung Metropolitan Municipality (Mangaung Disaster Risk Management Policy Framework, 2015:9).

3.6.6 The Mangaung Metropolitan Municipal Disaster Management Framework

The MMM DRM Framework has been aligned to the provisions of the DMA (2002), The NDMF of 2005 and the Free State Provincial Disaster Management Framework. In addition, the policy provides for the planning and management of the most common hazards prevalent within the jurisdiction of the MMM. The following 25 general hazards have been identified in the MMM Drought, Extreme Cold, Heat Wave, Hail, Windstorm, Tornado, Floods, Structural Fires, Veld fires, Earthquake, Human Epidemic, Animal Epidemic, Hazmat Transportation, Hazmat Fixed Facility, Hazmat Biological (Anthrax) Hazmat, Radioactive, Fire and Explosion, Motor Vehicle Transport, Rail Transport, Aircraft, Dam Failure, Hostage/Hijack Incidents, Reservoir Break, Snow and Water Contamination.

However, Table 3.6 below shows the 13 major hazard categories that are prevalent in the MMM (MMM DMP, 2016:14).

Table 3.6 Hazard categories in the Mangaung Metropolitan Municipality and possible consequences if untreated

Hazard/Hazard Category	Consequences
Animal Disease	Most animal disease emergencies present little direct threat to human health; however, the cost in purely economic terms may be particularly significant. Many rural residents rely on their animals for subsistence, and there are a number of larger animal-based industries in the Province.

Fire (Veld/Structural)	Loss of life (loss of breadwinner), severe injury, loss of homes, loss of crops, stock losses, of grazing land, loss of income, disruption of economy. Stretching of the emergency response capability.
Flood/Severe Storm, Rainfall and Landslides	Loss of life (loss of breadwinner), severe injury, loss of homes, loss of stock loss of income, increased risk of disease.
Hazardous Material	Loss of life (loss of breadwinner), severe injury, evacuation of large areas, fires, explosions, ground and air pollution. Road and rail transport travelling through the province carrying dangerous chemicals and corrosive substances poses the threat of a significantly dangerous accident.
Human Epidemic	Loss of life (loss of breadwinner), extended illness, loss of employment because of absenteeism, over-taxing of the medical response capability.
Major Infrastructure Failure	Loss of electrical power, causing lack of heating; lack of refrigeration; limited fuel supplies; loss of employment through closures of industry. Loss of communications, leading to severe impact on the municipal and provincial disaster co-ordination ability. Loss of telephone, fax, computer (internet), automated teller machines, electronic sales.
Major Transportation	Loss of life (loss of breadwinner), severe injury, loss of income, stretching of response and medical capability. Transport could involve aircraft, trains, tour coaches, school buses, taxis or heavy transport vehicles.
Terrorist Activity	Loss of life (loss of breadwinner), severe injury, loss of income. Combination of the consequences from all other hazards, dependent upon the type of terrorist activity employed.
Water Contamination	Increased disease, loss of life, loss of stock, pressure on health facilities.
Heat wave	Excessive drought, loss of crops, diseases, loss of life
Extreme cold	Loss of livestock, loss of crops, diseases,
Hostage/ hijack incidents	Loss of human life, economic loss
Snow	Economic loss, loss of human life, livestock and infrastructure.

(Source: MMM DMP, 2016:22)

In Table 3.6, the first column indicates the hazard group and the second column shows the potential loss to be suffered if the risks posed by the hazards are not planned for. One may argue that there are too many hazards present in the MMM and a scientific

Risk Management Plan must be developed to reprioritise, reduce, plan and prepare for a fewer risks.

The main departmental role-players such as the South African Weather Services, The Department of Water Affairs and Forestry, The Department of Agriculture and the Department of Health for the MMM are required to develop sectoral DRM plans relevant to its functional competence with a monitoring mechanism. These DRM Plans are then updated on an annual basis and sent to the Free State PDRMC and the South African NDRMC (MMM DMP, 2016:41).

When an activation alert is received from the head of the MMM DRMC, all IDRMC members are required to immediately report to the operation centre. An initial specialist inspection is conducted by the IDRMC who then informs the appropriate hazard specific response team such as the drought task teams or fire task teams to take responsibility for the management of these events. Specific response teams are assigned hazard specific management responsibilities because they have the necessary expertise and operate within a framework called the Standard Operating Procedures (SOP) (MMM DMP, 2016:27).

However, in the Free State Province there is a lack of understanding of DRM as a concept because of inappropriate qualification and experience, which has been identified as a risk factor. According to the MMM DMP (2016:17), lack of proper road infrastructure and effective communication system, especially in rural areas have also been identified as risk factors to effective Disaster Risk Management (MMM DMP, 2016:17). For this reason, the Department of Cooperative Governance and Traditional Affairs (COGTA) has developed the National Disaster Management Capacity Building Action Plan 2015 (NDMCBAP, 2015:2).

In recognising the inadequacies, the MMM DMP has outlined many risk reduction strategies. This includes, capacity building, training and development and general community awareness campaigns. The MMM DM Plan clearly states the procedure and process to be followed in classifying and declaring the state of a disaster within the provisions of the DMA (2002). In addition, the MMM DMP specifies the establishment of a communications system to receive and transmit information between the Disaster Risk Management Centre and the other relevant stakeholders.

In this respect, the PDMC will play a pivotal role to foster a working relationship between the MMM DRMC the local and national media (FS PDMF, 2007:25).

3.6.7 Summary of Disaster Risk Management in the Mangaung Metropolitan Municipality

The main requirement of the MSA (2000) is the development of an Integrated Development Plan (IDP). Disaster Risk Management is the 10th Programme on the IDP of the Mangaung Metropolitan Municipality. In this regard, the Disaster Risk Management Plan (DMP) of the MMM has developed as set of objectives to support its risk reduction programmes. Some of the objectives include:

- To establish a NDMF (2005) for the municipality as legislated in the DMA (2002),
- To define priority objectives;
- To identify and address challenges to manage disaster risks;
- To set the corporate structure and institutional arrangements for the management of disasters; and
- To set the key requirements for the effective functioning of the Disaster Risk Management Centre (MMM DMP, 2016:14).

Furthermore, the Mangaung Metropolitan Municipality Disaster Management Plan (MMM DMP) is guided by a blueprint, which is the Mangaung Metropolitan Municipality Disaster Management Framework (MMM DMF). The MMM DMF outlines the organisational structure and the reporting arrangements for the MMM. In this regard, the Mayor is executive authority in the Mayoral Council who presides over the strategic management of the Mangaung Metropolitan Disaster Management Centre. Amongst others, the main departmental role-players are The South African Weather Services, The Department of Water Affairs and Forestry, The Department of Agriculture and the Department of Health for the Mangaung Metropolitan Municipality (Mangaung Risk Management Policy Framework, 2015:9).

The Hazard Analysis process found that the MMM is vulnerable to the following 25 hazards: Drought, Extreme Cold, Heat Wave, Hail, Windstorm, Tornado, Floods, Structural Fires, Veld fires, Earthquakes, Human Epidemic, Animal Epidemic, Hazmat

Transportation, Hazmat Fixed Facility, Hazmat Biological (Anthrax) Hazmat, Radioactive, Fire and Explosion, Motor Vehicles Transport, Rail Transport, Aircraft, Dam Failure, Hostage/Hijack Incidents, Reservoir Breaks, Snow and Water Contamination. One may argue that these hazards may be reprioritised for effective risk management purposes and for adequate response and recovery programmes to be developed.

For this reason, event-specific response teams such as a drought response team has been established. This is a specific task team with drought-related expertise and when required to do so, will work according to specific standard operating procedures (SOP) (MMM DMP, 2016:16). However, the MMM is a very recent establishment since it was launched in 2014 and requires adequate funding and other resources to function optimally (MMM DMP, 2016:16).

3.7. SUMMARY OF DISASTER RISK MANAGEMENT SERVICES: CAPE TOWN METROPOLITAN MUNICIPALITY, THE EKURHULENI METROPOLITAN MUNICIPALITY AND THE MANGAUNG METROPOLITAN MUNICIPALITY.

Section 1.2.2.2 of the NDMF (2005:21) refers to minimum requirements for providing effective Disaster Risk Management services. An in-depth study of the Free State Municipalities was conducted to establish whether the municipalities were adequately resourced in terms of the legislative requirements to provide DRM services of acceptable level.

Firstly, the DRM functioning in the City of Cape Town Metropolitan Municipality, the Ekurhuleni Metropolitan Municipality and the Mangaung Metropolitan Municipality were compared. In this section, the comparison was conducted because the Metropolitan municipalities are the most densely populated municipalities in South Africa and all metropolitan municipalities are faced with hazards specific vulnerabilities.

The comparison shows that the City of Cape Town (CoCT) prior arrangements have been made for sectoral departments to use their expertise and develop individualised DRMP. In the event of a disaster or major event, the City of Cape Town Disaster Risk Management Centre takes the lead in the coordination of disaster events. This

arrangement has been working well for the City of Cape Town, and it has been awarded “Role-model” status by for its extensive and elaborate workable disaster risk management services by the United Nations (UN).

The Ekurhuleni Disaster Risk Management Centre has adopted a Community-Based Disaster Risk Reduction (CBDRR) approach in developing their plans. Disaster Risk Management consultation with the communities followed a two-pronged process, firstly externally, the communities were required to respond to the survey and then to make their contribution on the website. Secondly, the internal stakeholders were also required to feed into the responses of the communities. In this way, the Ekurhuleni Disaster Risk Management plan has gone through rigorous consultative processes for which, it is regarded as one of the most accepted municipal plans in South Africa.

The Mangaung Metropolitan Municipality has recently established its Disaster Risk Management Centre, which is still to be opened officially. Its Disaster Risk Management Plan is also an extensive plan, which is comparable to that of Ekurhuleni and CoCT. In addition, an internal disaster risk-management committee has been formed to promote interdepartmental relations. Accordingly, the municipal departmental plans have been integrated to form the composite Mangaung Metropolitan Municipal Plan. The sectoral plans have also been aligned to the provincial and metropolitan Disaster Risk Management policy framework of 2015. However, a detailed response to this research objective (RO5) is discussed in Chapter 7 of this study. Furthermore, a detailed discussion of the state of the MMM, the four district and the nineteen local municipalities of the Free State Province is presented in Chapter 7 of this study.

The comparative analysis could have been done differently, with regard to specific factors being compared, such as the similarities and/or the difference in funding, human resources and equipment amongst the three municipalities should have been compared. Furthermore, the extent to which disaster risk-management services differ in relation to the resources each municipality has been allocated in the Free State Province has been discussed in Chapter 7 of this study.

3.8 AN OVERVIEW OF DISASTER RISK MANAGEMENT IN THE FREE STATE PROVINCE

The discussion below outlines an overview of the Disaster Risk Management services in the Free State Province.

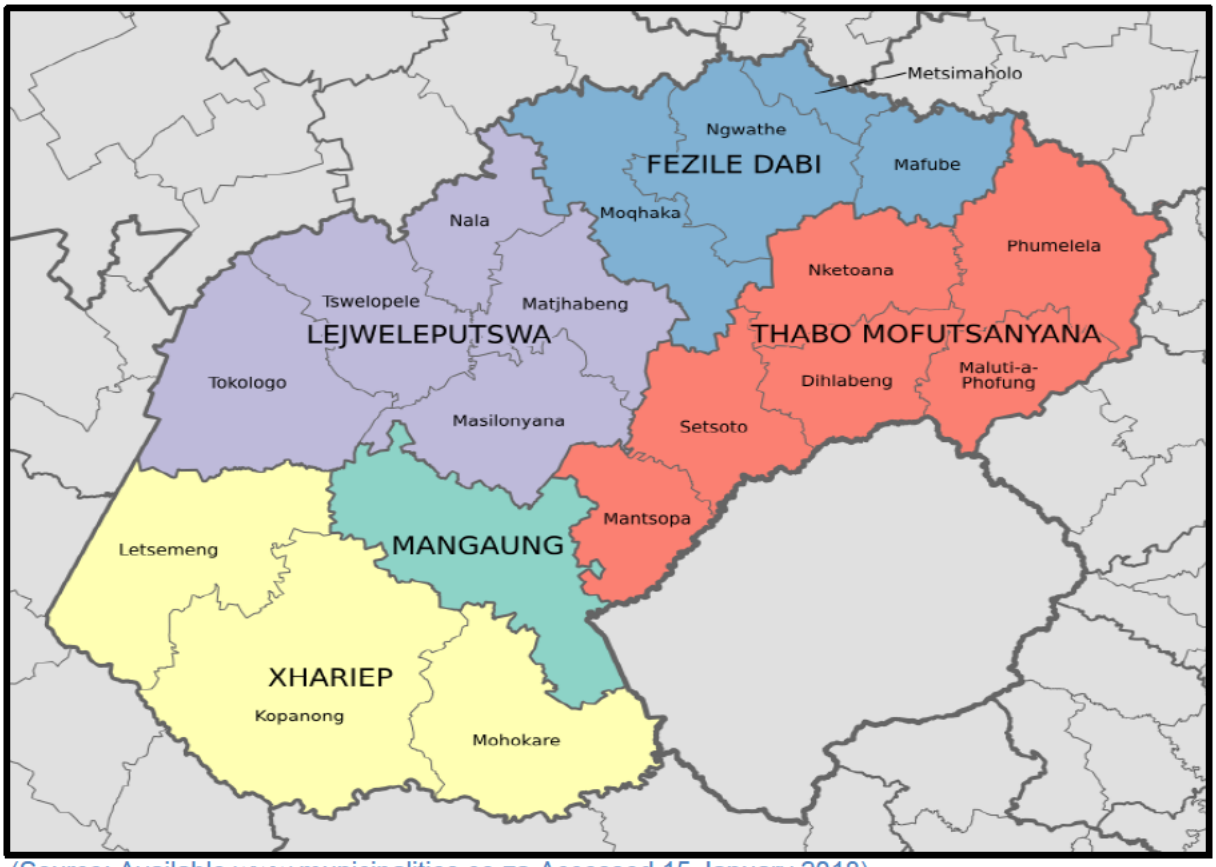
3.8.1 Background: Disaster Risk Management in the Free State Province

As indicated in Figure 3.6, below, the Free State Province is the third largest of the nine provinces of South Africa, occupying a land space of about 129 825 km^2. In addition to being located at the centre of the country, it shares its borders with six of the country's nine provinces. Moreover, it also shares an international border with neighbouring Lesotho, towards the Southeast as can be seen on the map below. Also of note is that it is a well-maintained network of rail, road and air transport connects it to all the provinces. However, this cosmopolitan province has quite a low population density compared to the rest of the country's metropolitan municipalities (FSGDS Phase 2 Report, 2013:2).

Figure 3.6 below is the map of the Free State Province, which is also indicated in Chapter 1 of this study. The MMM and the four District Municipalities are colour-coded. The MMM is colour coded green and indicates Bloemfontein as the capital city of the Province. The Fezile Dabi District is shaded blue in colour on the map and is made up of four local Municipalities Ngwathe, Metsimaholo, Mafube and Moqhaka. The Lejweleputswa District Municipality is shaded purple and is made up of five local municipalities, Tswelopele, Nala, Matjhabeng, Tokologo and Masilonyana. Thabo Mofutsanyana is brown in colour and is made up of 6 local municipalities, Phumelela, Maluti-a-Phofung, Dihlabeng, Setsoto, Mantsopa and Nketoana. The Xhariep District is shaded yellow in colour and is made up of three local municipalities, Kopanong, Mohokare and Letsemeng.

The next section discusses the population of the Free State Province in each of its district and local municipalities.

Figure 3.6 Map of the Free State Province showing the metropolitan, district and local municipalities of the Free State Province.



(Source: Available www.municipalities.co.za Accessed 15 January 2018)

3.8.2 Population Distribution in the Free State Province

The Free State Province has the second lowest provincial population density in South Africa, which has increased from 20.3 per km^2 in 2007 to 21.1 per km^2 in 2011. In comparison, Gauteng Province has registered the highest population density in South Africa, at 432 people per km^2 in 1996, which has risen to 675.1 per km^2 in 2011. However, the South African population density has risen from 33.3 per km^2 in 1996, to about 42.4 per $^{k}m^2$ in 2011, as reflected in Figure 3.6 above (Stats SA, 2011:20).

Table 3.7. Population of the Free State metropolitan, district, and local municipalities for 2001 and 2011

Area	Population		Population Growth (% p.a)
	2001	2011	2001-2011
SOUTH AFRICA	**44 819 777**	**51 770 561**	**1.44**
FREE STATE PROVINCE	**2 706 775**	**2 745 590**	**0.14**
Mangaung Metropolitan	**645 440**	**747 431**	**1.47**
Xhariep District Municipality	**162 727**	**146 259**	**-1.07**
Letsemeng Local Municipality	42 847	38 628	-1.04
Kopanong Local Municipality	56 079	49 171	-1.31
Mohokare Local Municipality	36 321	34 146	-0.62
Naledi Local Municipality	27 479	24 314	-1.22
Lejweleputswa District Municipality	**657 012**	**627 626**	**-0.46**
Masilonyana Local Municipality	64 409	63 334	-0.17
Tokologo Local Municipality	32 455	28 986	-1.13
Tswelopele Local Municipality	53 714	47 625	-1.20
Matjhabeng Local Municipality	408 170	406 461	-0.04
Nala Local Municipality	98 264	81 220	-1.90
Thabo Mofutsanyana District Municipality	**782 302**	**736 238**	**-0.61**
Setsoto Local Municipality	123 194	112 597	-0.90
Dihlabeng Local Municipality	129 338	128 704	-0.05
Nketoana Local Municipality	61 951	60 324	-0.27
Maluti -a- Phofung Local Municipality	360 549	335 784	-0.71
Phumelela Local Municipality	51 928	47 772	-0.83
Mantsopa Local Municipality	53 342	51 056	-0.81
Fezile Dabi District Municipality	**459 294**	**488 036**	**0.61**
Moqhaka Local Municipality	167 892	160 532	-0.45
Ngwathe Local Municipality	118 810	120 520	0.14
Metsimaholo Local Municipality	115 955	149 108	2.51
Mafube Local Municipality	56 637	57 876	0.22

(Source: Stats SA, 2011:23)

According to Table 3.7 above, the Free State Province is made up of I Metropolitan Municipality, 4 District Municipalities and 19 Local municipalities. Although Table 3.7 shows that the Free State is made up of 19 Local Municipalities, there are actually 18. Figure 3.6 (Map of the Fee State above) shows that there are 18 Local municipalities because the Naledi Local Municipality of the Xhariep District has been incorporated

into the Mangaung Metropolitan Municipality, leaving the Xhariep District with three local municipalities, namely the Letsemeng, Kopanong and Mohokare Local municipalities.

In addition, from Table 3.7 above one can establish that the population of South Africa has increased by 1.44% between 2001 and 2011, the population of the Free State province has risen by 0.44%. Although, the Mangaung Metropolitan Municipality had a population of just over 747 431 in 2011, the population of Mangaung grew by 1.47% between 2001 and 2011. This is more than the growth registered by the Free State province as well as by the country, (South Africa) for the same period. Table 3.7 also shows that there is a slight decrease in the population of Thabo Mofutsanyana, Lejweleputswa and Xhariep District Municipalities, whereas the population of Fezile Dabi District Municipality increased slightly (Stats SA, 2011:23).

3.8.3 The Free State Disaster Risk Management Centres in compliance with Disaster Risk Management legislation

For effective Disaster Risk Management services, municipalities are required to comply with the minimum legislative requirements. Table 3.8 below shows whether the Free State Province, the MMM have their Disaster Management centre head appointed, the Disaster Management Centre established, Disaster Management Plans approved and whether the Free State Province and the MMM is working within the ambit of the NDMF (2005).

Table 3.8 also indicates whether the 4 Free State District Municipalities, which are the Thabo Mofutsanyana District Municipality, the Xhariep District Municipality, Fezile Dabi District Municipality and Lejweleputswa District Municipality are in compliance by having the Disaster Management Centre head appointed, DPMs approved and that they are also working within the confines of the NDMF (2005). However, the absence of a fully functional Disaster Management Centre especially for the Thabo Mofutsanyana District and Xhariep District Municipality may pose a serious challenge for effective DRM service delivery.

Table 3.8 Extent of Free State provincial, metropolitan and district municipalities complying with basic requirements for a Disaster Management Centre

Municipality	**Disaster Management Centre Established: Yes/No**	**Head of Centre Appointed (Dedicated Official)**	**Disaster Management Forums Established: Yes/No**	**Disaster Management Framework Developed: Yes/No**	**Disaster Management Plans Developed: Yes/No**
Provincial Disaster Management Centre	Yes	Yes	Yes	Yes – not yet adopted	No – to be reviewed
Mangaung **Metropolitan** Municipality	Yes	Yes	No	No	Yes
Thabo Mofutsanyana **District** Municipality	No	Yes	Yes	Yes	No
Xhariep **District** Municipality	No	Yes	Yes	Yes	No
Fezile Dabi: **District** Municipality	Yes	Yes	Yes	Yes	Yes
Lejweleputswa: **District** Municipality	Yes	Yes	Yes	No	Yes

(Source: Adapted from Free State DRM Annual Report, 2016)

According to Table 3.8, the Free State Province qualifies for the establishment of six Disaster Risk Management Centres, namely the Provincial, metropolitan and four district-disaster municipalities. Table 3.8 also shows that of the four district municipalities Thabo Mofutsanyana and Xhariep Districts have not established their disaster management centres, whilst Fezile Dabi and Lejweleputswa District have established fully functional centres.

Table 3.8 above, also portrays that The Mangaung Metropolitan Municipality is functioning without a Disaster Management Forum and the Framework (DMF) whilst the Thabo Mofutsanyana and Xhariep Districts have not yet developed their DMP.

Furthermore, the Provincial, Metropolitan as well as the District Disaster Management Centre's (DMC) are at different stages of readiness to provide adequate Disaster Risk Management services. For this reason, one may argue the Free State as a Province is not adequately equipped to render adequate and effective Disaster Risk Management services.

3.8.4 Disaster Risk Management Services in the Free State

The Free State Provincial Disaster Management Framework (2007:25) makes provision for an extensive consultative process between the Provincial Disaster Management Advisory Forum (PDMAF), the communities and Disaster Risk Management professionals with a view to developing a risk reduction to its minimum. Thus, the Provincial Disaster Management Centre (PDMC), from where the PDMAF conducts its DRM business supports the entire Free State Province in its DRM activities. In this respect, the PDMAF supports the four districts which are the Lejweleputswa District Municipality, the Fezile Dabi district Municipality, the Thabo Mofutsanyana district Municipality and the Xhariep District Municipality. This includes the Mangaung Metropolitan Municipality and the 19 local municipalities, although the Naledi local municipality from the Xhariep District has been incorporated into the Mangaung Metropolitan Municipality.

The MMM's DMP has identified six goals to eliminate and/or reduce disaster risks. They are:

- preventing or reducing or reduce the risk of disasters occurring;
- mitigating the severity or consequences of disaster by promoting sustainable development and sustainable livelihood;
- increasing and expanding existing emergency preparedness strategies,
- ensuring rapid and effective disaster response;
- planning for effective post-disaster recovery and rehabilitation by the incorporation of developmental initiatives; and
- ensuring effective institutional arrangements for efficient disaster risk management (MMM DMP, 2016:8).

For this reason, the Free State Provincial Disaster Management Centre (PDMC) head has been appointed, the Provincial Disaster Management Advisory Forum (PDMAF) is properly constituted and holds regular meetings, Furthermore, PDMAF has developed the Provincial Disaster Management Plan (PDMP), which is regularly reviewed and updated. Although the PDMC strives to promote effective integrated and coordinated disaster risk management through partnerships with different stakeholders and through cooperative relations with other spheres of government, it is inundated with some serious challenges such as:

- Due to limited financial resources, the Free State PDMC is not adequately equipped with an information and communication system to operate effectively. This situation is compounded with the lack of personnel with the required skills and experience. This is an indication that the PDFMC is not functioning at its optimum level.
- The lack of disaster management capacity in the Xhariep and Thabo Mofutsanyana district municipalities is also of concern. Thus, the PDMC had to assist these municipalities in the development of their Disaster Management Frameworks.
- It is expected that hazard specific task teams will be assigned disaster related responsibilities which are in line with their experience for instance if there is urban flooding, the Water and Sanitation Department together with the Public Works, Roads and Transport should be attending to this situation since they have the necessary expertise to deal with urban flooding. It is important for these Departments to be familiar with Standard Operating Procedures for Urban Flooding. However, in many instances they do not have the necessary expertise, which is causing a challenge for the PDMC.
- The Xhariep and Thabo Mofutsanyana District Municipality as well as the following local municipalities have not developed their disaster management plans Nketoana, Maluti a Phofung, Phumelela, Setsoto, Dihlabeng, Metsimaholo, Ngwathe, Moqhaka, Mafube, Matjhabeng, Masilonyana and Nala. This is an indication that these municipalities either do not have the resources nor the capacity to develop disaster management plans which puts a burden on the PDMC to support these municipalities in the event of a disaster in the absence of a DRM Plan (NDMC Annual Report, 2010:51-52).

- From the above, one may argue that much more support in terms of finances, skilled personnel and equipment is required from senior management for effective disaster risk management services delivery in the Free State Provincial Disaster Management Centre.

The next section discusses DRM services in Free State District Municipalities.

3.9. DISASTER RISK MANAGEMENT SERVICES IN THE FREE STATE DISTRICT MUNICIPALITIES

This section will briefly discuss the state of Disaster Risk Management in the Free State District Municipalities.

There are four district municipalities in the Free State Province. These District municipalities are the Lejweleputswa District Municipality, the Thabo Mofutsanyana District Municipality, the Fezile Dabi District Municipality, and the Xhariep District Municipality. Although an extensive study has been conducted of all four district municipalities, for the purposes of this study only the Lejweleputswa District Municipality is discussed. The reason for choosing the Lejweleputswa district municipality is that it has more resources and is functioning better that the other districts as discussed below.

3.9.1 Disaster Risk Management services in The Lejweleputswa District Municipality

This Lejweleputswa District has five local municipalities within its jurisdiction Masilonyana, Tswelopele, Nala, Tokologo and Matjhabeng Local Municipality. The Matjhabeng local Municipality has a Disaster Risk Management Centre head appointed. The Disaster Risk Management Operation Centre and the Disaster Risk Management Advisory Forum (DMAF) have been established. All local municipalities in the Lejweleputswa district use the district DRM framework as a blueprint to develop their DRMPs. The DRM officials also participate in the district DMAF.

Table 3.9 showing the Lejweleputswa District Municipality with the following 5 local municipalities; Masilonyana Local Municipality, Tokologo Local Municipality,

Tswelopele Local Municipality, Matjhabeng Local Municipality and Nala Local Municipality

Table 3.9 Lejweleputswa District and Local Municipalities

Municipality	Disaster Management Centre Established	Head of Centre Appointed (Dedicated Official)	Disaster Management Forums Established	Disaster Management Plans developed	Disaster Management Framework developed
Lejweleputswa **District**	Yes (not fully functional)	Yes	Yes	Yes	Yes
Matjhabeng **Local**	No	No	Participate in district forum	Yes *	Use district framework
Masilonyana **Local**	No	No	Participate in district forum	Yes*	Use district framework
Tokologo **Local**	No	Yes	Participate in district forum	Yes*	Use district framework
Nala **Local**	No	No	Participate in district forum	Yes*	Use district framework
Tswelopele **Local**	No	Yes	Participate in district forum	Yes*	Use district framework

(Source: Adapted from Free State DRM Annual Report, 2016) *Represents Contingency DRM Plans.

3.9.1.1 Lejweleputswa District Municipality: Disaster Risk Management Annual Report Summary (2016).

Table 3.9 shows the Lejweleputswa District Municipality has appointed the head of centre, the DRM Framework and DRM Forum, which are functional. Although the plan has been developed and the centre is not fully functional due to lack of human and financial resources. Two of its local municipalities, Tokologo and Tswelopele have designated DRM officials appointed and they have their DRM contingency plans developed.

The head of the Disaster Risk Management Centre of the Lejweleputswa District Municipality was appointed in April 2005 and the Disaster Risk Management services is located within the Department of Social Services. Thus, the head of the DRM Centre reports to the Executive Manager of the Social Services Department, who in turn reports to the Municipal Manager of the Lejweleputswa District Municipality. Instead

of DRM Plans, contingency plans have been compiled and distributed to the 5 local municipalities which are the Masilonyana, Tswelopele, Nala, Tokologo and Matjhabeng Local Municipality (DRM Annual Report, 2016:12).

The next section discusses the DRM of the Lejweleputswa District Municipality according to the requirements of the Integrated Development Plan of the Mangaung Metropolitan Municipality.

3.9.1.2 Lejweleputswa District Municipality: Disaster Risk Management Integrated Development Plan Assessment Report (2016).

The Integrated Development Plan discusses the status of Disaster Risk Management in the Lejweleputswa District Municipality. Table 3.10 also shows to what extent the Lejweleputswa District has achieved the 9 criteria agreed upon by the commission that carried out the assessment. The Assessment Commission was made up of officials from the PDMC, SALGA and CoGTA.

Table 3.10 The state of DRM in the Lejweleputswa District Municipality

Lejweleputswa District Municipality		
STATUS		
10.1. Is there a project on the development of a Disaster Management plan for the municipality in the IDP?	PA	Adopted Disaster Management Plan in place. Not included in the IDP. PDMC and SALGA will support on the implementation of the DM plan.
10.2 Did the municipality develop the disaster preparedness programme for 2016-2017?	A	Budget allocated for the programmes, not reflected in the IDP. PDMC and SALGA will assist municipality
10.3 Has the municipality identified disaster management institutional arrangement projects in the IDP?	A	Disaster Management Advisory Forum in place. Regular meetings. The PDMC and SALGA will assist the municipality in identifying and implement institutional arrangements.
10.4 Do you have disaster risk-assessment projects in the IDP?	PA	The PDMC will conduct disaster risk assessment to support all municipalities.
10.5 Are there any disaster risk-reduction projects in the IDP?	A	There is budget for disaster awareness programmes. PDMC and SALGA will support.

10.6 Are there any disaster response and recovery projects in the IDP?	A	There is budget for disaster response and relief. The PDMC and SALGA will assist to implement.
10.7 Are there disaster management information and communication projects in the IDP?	PA	The information and communication projects are included in the IDP.
10.8 Are disaster management education, public awareness, and training and research projects in the IDP?	A	Disaster risk-reduction projects are budgeted for and PDMC and SALGA will support to implement.
10.9 Do you have fire management projects in the IDP?	PA	The municipality has a fire management plan. PDMC and SALGA will support to implement.

(Source: Adapted from the Free State IDP Report, 2016)

3.9.1.3 Integrated Development Plan findings and interpretation of Disaster Risk Management in the Lejweleputswa District Municipality

According to Table 3.10 above, the Lejweleputswa District Municipality achieved 5 of the 9 IDP requirements, which indicates the level of compliance. Accordingly, the symbol A refers to achieved; PA refers to partially achieved; and NA refers to not achieved. However, the DMP has not been included in the IDP, Disaster Risk Assessment has not been conducted, and information and communication projects included in the IDP need some attention. For these reasons, one may argue that the Lejweleputswa District Municipality is not fully in compliance with the basic requirements of the IDP and therefore may not be able to render adequate DRM services.

3.9.2 Disaster Risk Management services in The Free State Local Municipalities

An in-depth study of all 19 local municipalities in the Free State Province are discussed and presented in Section 1.8.4 of this study. However, for the purposes of this study, only the Tswelopele Local Municipality of the Lejweleputswa District is presented below. The reason for the choice of the Lejweleputswa District and one of its local municipalities (Tswelopele Local Municipality) is that they are both considered the better performing of all the Districts, as well as the local municipalities in the Free State Province, respectively.

3.9.2.1 Disaster Risk Management services in The Tswelopele Local Municipality

An assessment of the Disaster Risk Management Services in the Tswelopele Local Municipality was carried out by an Assessment Commission at the Bloem Spa in the Free State Province in 2016. This Assessment Commission was made up of officials from the PDMC, SALGA and CoGTA to assess the status of Disaster Risk Management in the Tswelopele Local Municipality. Table 3.11 shows the Assessment Commission's Report of 2016, which outlines to what extent the Tswelopele Local Municipality achieved the nine criteria agreed upon by the commission that carried out the assessment.

Table 3.11 The status of the Tswelopele Local Municipality

Tswelopele Local Municipality		
STATUS		
10.1 Is there a project on the development of a Disaster Management plan for the municipality in the IDP?	PA	Plan adopted by council but not in IDP. PDMC and SALGA will support.
10.2 Did the municipality develop the disaster preparedness programme for 2016-2017?	NA	Preparedness programmes identified, but not in IDP. PDMC and SALGA will support.
10.3 Has the municipality identified disaster management institutional arrangement projects in the IDP?	NA	Yes. DMAF in place. Not incl. in IDP. PDMC and SALGA will assist.
10.4 Do you have disaster risk-assessment projects in the IDP?	NA	No. The PDMC will conduct Disaster Risk Assessment.
10.5 Are there any disaster risk-reduction projects in the IDP?	NA	No. Disaster risk-reduction projects identified. PDMC and SALGA will support.
10.6 Are there any disaster response and recovery projects in the IDP?	NA	No budget for response and relief. PDMC and SALGA will assist.
10.7 Are there disaster management information and communication projects in the IDP?	NA	No Information and communication projects identified. PDMC and SALGA will support.
10.8 Are disaster management education, public awareness, and training and research projects in the IDP?	NA	No Disaster risk-reduction projects identified. The PDMC and SALGA will support.
10.9 Do you have fire management projects in the IDP?	NA	Yes. Draft Fire Management Plan is in place. PDMC and SALGA will support.

(Source: Adapted from the Free State IDP Report, 2016)

3.9.2.2 Findings and interpretation of Disaster Risk Management Services in The Tswelopele Local Municipality

According to Table 3.11 above, the Tswelopele Local Municipality did not achieve 8 of the 9 IDP criteria and partially achieved only 1 criterion. Although the DRM Plan has been developed, it has not been formally adopted and is therefore not reflected in the IDP. Table 3.11 also shows that the Tswelopele Local Municipality has developed a Fire Management Plan, which is still in its draft stages and it has identified preparedness programmes that are also not included in the IDP. In addition, risk assessment has not been carried out, no risk reduction projects that have been identified and no budget has been allocated for response and relief projects.

In the light of the above, one may argue that the Tswelopele Local Municipality does not comply with the basic requirements of the IDP and therefore may not be able to render adequate Disaster Risk Management services. Although the Tswelopele Local Municipality is the best- serving local municipality in the Lejweleputswa District Municipality, it requires lots of support in terms of human resources, financial resources and relevant equipment to render an effective Disaster Risk Management service.

3.10 SUMMARY OF DISASTER RISK MANAGEMENT SERVICES IN THE FREE STATE PROVINCE

According to the NDMF (2005:4), the DMA (2002) provides for cooperative governance for the management of disaster risks and emphasises that all stakeholders must me involved to support national, provincial and municipal organs of state to reduce disaster risks. It is in this spirit that the Free State Provincial Disaster Management Advisory Forum (PDMAF) has been supporting the Disaster Risk Management services at the Mangaung Metropolitan Municipality, the 4 district Municipalities in the Free State and the 19 local municipalities that provides disaster risk-management services to the Free State Province.

The Free State Disaster Risk Management Annual Report (DRM ARC) (2016), The Free State Integrated Development Plan Report (2016) and the Disaster Risk

Management Assessment Commission Report (2016) were used to establish the extent to which the Free State Province is functioning in the 4 Key performance Areas and the 3 Enablers stipulated in the NDMF (NDMF, 2005:6-226).

It was found by the DRM ARC (2016:1) that the Disaster Risk Management officials were appointed in all municipalities in the Free State Province, but not in sufficient numbers to render effective DRM services. The following local municipalities have appointed DRM focal personnel Naledi, Mantsopa, Tswelopele, Tokologo, Setsoto, Metsimaholo, and Matjhabeng.

Regarding Disaster Risk Planning and Reduction, the Mangaung Metropolitan Municipality, Fezile Dabi, Lejweleputswa and Xhariep District Municipalities, and Dihlabeng, Tokologo and Tswelopele Local Municipalities have adopted their disaster management plans. In contrast, the Thabo Mofutsanyana and 16 local municipalities either have not yet developed their plans, or it has been developed but not approved yet.

However, the DRM ARC (2016:2) found that all four Free State District Municipalities except the Mangaung Metropolitan Municipality have properly constituted Disaster Risk Management Advisory Forums (DMAF). The DMAF is a multi-stakeholder forum, which represents the private and public sector institutions and forms an integral part of the MMM. Although it does not have decision-making powers, it is an independent advisory forum, which makes valuable contributions in terms of DRM. The Disaster Risk Management Assessment Commission Report (2016:3) also found that most disaster-management functionaries are not involved in the DRM planning processes. One may argue that officials who are not involved in the DRM planning process are either unaware of their DRM responsibilities or are unaware that DRM is a multi-stakeholder, multidimensional responsibility.

As far as Disaster Response and Recovery is concerned, it was reported in the DRM ARC (2016:3) that all municipalities have disaster management contingency plans. However, these contingency plans, which should include Disaster Response and Recovery projects are not attached to the IDPs. Furthermore, most municipalities perceive disaster. Response and recovery programmes as the procurement of goods to support communities during disastrous incidences.

Most of the municipalities who have Disaster Management Plans have not budgeted for disaster management programmes as mentioned in their plans. The Mangaung Metropolitan Municipality, the four district municipalities and the following local municipalities have developed their budgets Setsoto, Tokologo Local Municipality, Tswelopele Local Municipality, Metsimaholo Local Municipality and Dihlabeng Local Municipality. The DRM ARC (2016:4) also indicates that an amount of R20 000 was budgeted for by the Xhariep District Municipality, which is negligible for effective DRM functioning.

In this regard, the Xhariep District Municipality and the local municipalities within its jurisdiction that are prone to fire disasters have not made provision for fire disasters in their DRM Plans. The DRM ARC (2016:4) report also found that most of the municipalities such as Mangaung Metropolitan Municipality, the Fezile Dabi District Municipality, and the following local municipalities Matjhabeng, Moqhaka, Metsimaholo, Ngwathe, Dihlabeng and Maluti-a-Phofung that do have 24-hour fire brigade services have limited resources and equipment to render effective fire management services. Another important finding is that there is a misunderstanding that most of the local municipalities that the Disaster Risk Management function is exclusively the competency of the District Municipality. For this reason, most local municipalities focus on disaster risk response rather than on prevention and mitigation strategies.

There are 24 municipalities in the Free State Province, of which the Mangaung Metropolitan Municipality is the only municipality to have conducted a scientific Disaster Risk Assessment, which, in any event, was carried out by an external service provider (Aurecon Engineering Consultants), (Annual Report, 2016: 24).

For these reasons, Quarantelli (1996:4) argues that effective Disaster Risk Management is the difference between response-generated needs and agent generated needs. Agent generated need refers to planning ahead to a point and no more. This means that the planning is restricted and DRM official should not go beyond the confines of their planning framework. In other words, a tactical response means to adhere to the plans. In this regard a tactical response is a response to a situation for which prior planning has been done (Quarantelli, 1996:4).

In the light of the above, response-generated planning is more strategic in that the planning for disaster situation is well ahead. It is undefined and the decision-making options are open. This means that DRM officials will prepare for and respond to a situation as it emerges during a disaster. In other words, DRM officials must be trained to make strategic decisions and, when in a disaster situation, not to just respond as prescribed by the DRM plans. Thus, the response becomes a strategic response. However, understanding the both types of responses will lead to better operational responses. Conversely, not understanding the two will lead to ineffective Disaster Risk Management (Quarantelli, 1996:4).

The emphasis is on the need for intra-and inter-organisational integration of DRM activities. In this way, skilled personnel from other directorates and departments may be used and financial planning must be considered by other departments as well, as they plan and prepare for Disaster Risk Management in South African municipalities (SALGA, 2011:98). Notwithstanding the fact that DRM may provide fertile grounds for collaborative work, where DRM skills and expertise may be transferred across municipalities and departments, it may also instil negative tendencies because of a lack of capacities, such as funding and other resources (UNISDR, Global Assessment Report, 2011:9). Since DRM requires a well-coordinated, multifaceted, multisectoral management approach, negative tendencies may lower the morale and demotivate staff (UNISDR, Global Assessment Report, 2011:9).

In South Africa, there are many reasons why the workforce may be demotivated. Some of these reasons are that the workforce landscape has drastically changed during the past few years from a previously racially biased sector to a more representative one (SALGA, 2011:98). Another reason is that there is a lack of DRM skills at senior management level, as a result, down line staff cannot look up to their supervisors for the necessary support. The lack of funding for Disaster Risk Management activities limits the scope for staff training and development in the DRM sector (SALGA, 2011:98).

The effective institutional administration and management are very important tools in maintaining highly motivated staff, especially in the South African context. In this regard, Faulkner (2001:135-147) contends that in Chaos Theory, minor infringements by demotivated staff may destabilise entire organisations and, unless managed

effectively, these so-called insignificant management issues may lead to chaotic responses, especially after a disaster strikes, leading to further loss of lives (Faulkner, 2001:147).

3.11 CONCLUSION

In this chapter, the general functioning of the functioning of disaster management in South Africa was discussed. This included the location of disaster risk management within the department of Cooperative Governance and Traditional Affairs and the role of the South African Local Government Association with regard to DRM.

An in depth study of the governance and administration of disaster management services including the Free State Provincial Disaster Management Centre, the Mangaung Metropolitan Municipality, the four district municipalities and the 19 local municipalities was conducted. A comparative analysis of the disaster management functions of the Mangaung Metropolitan Municipality was also compared to that of the City of Cape Town and the Ekurhuleni Metropolitan municipality. This included the level of compliance of the various municipalities with DRM legislation.

The next chapter discusses the international and national frameworks and models of Disaster Risk Management.

CHAPTER FOUR: INTERNATIONAL AND NATIONAL FRAMEWORKS AND MODELS OF DISASTER RISK MANAGEMENT

4.1 INTRODUCTION

In the previous literature chapters, the statutory and legislative frameworks and the state of Disaster Risk Management in the Free State Municipalities, respectively, were discussed. This chapter will discuss the International and National Frameworks, strategies and models of Disaster Risk Management.

The focus of this chapter is on International and National DRM Frameworks and models. In this regard there is a great deal of literature; yet, few tools are available to support the implementation thereof (United Nations FAO, 2008:2). This is of concern, since the social and financial implications of managing Disaster Risks are enormous. Money used to restore the lives of people and rebuild infrastructure destroyed due to ineffective DRM practices, could be well spent by introducing preventative measures that are is far less costly. Therefore, this chapter will discuss international and national frameworks and models of Disaster Risk Management with a view to developing a model for the Free State Municipalities (United Nations FAO, 2008:2).

Disaster Risk Management (DRM) models add to our understanding of complex social, economic and physical events that interplay with disaster risk management. In this regard Pine (2015:60) and Kelly in Asghar *et al*., (1998:25) allude to the visualising, simplifying and understanding of complex concepts involved in the development of models. Since every municipality in the different spheres of government in South Africa are required by legislation to provide Disaster Risk Management services, it is obligatory that all officials and volunteers have a common understanding of the concepts, elements and the functioning of DRM. In this regard, the importance of a basic DRM model that could facilitate a common understanding of the functioning of a DRM model cannot be discounted (Kelly, 1998:25 in Asghar *et al*., 1998:25; Pine, 2015:60).

The analysis of international and national DRM frameworks and models will assist the researcher in identifying key principles, components and demands that need to be

considered with the development of a proposed integrated DRM model for municipalities in the Free State Province.

4.2 INTERNATIONAL COMMISSIONS, STRATEGIES AND FRAMEWORKS CONCERNING HUMAN RIGHTS AND DISASTER RISK MANAGEMENT

The discussion about the international frameworks concerning human rights and Disaster Risk Management commences with a discussion about the United Nations Commission on Human Rights (UNCHR). It is followed by a discussion of the African Union (AU) Report on Disaster Risk Reduction and how these rights impact on *Constitution of the Republic of South Africa, 1996*, with specific reference to Chapter 2 of the Bill of Rights. This, in turn, is followed by a discussion about the United Nations International Strategy for Disaster Reduction (UNISDR) and other International treaties concerning Climate Change and Pollution.

4.2.1 The United Nations Commission on Human Rights (UNCHR)

The United Nations Commission on Human Rights (UNCHR) Charter: Part III Article 6, identifies that, “every human being has the inherent right to life. This right shall be protected by law and … no one shall be arbitrarily deprived of life”. For this reason, the United Nations Secretary-General argued that the more the international community understands disaster risks and vulnerability, the better equipped they will be to provide an effective global response with the limited resources at their disposal, thereby saving more lives. It is common knowledge, that every year, many thousands of lives are lost because of disasters such as earthquakes, floods and droughts, amongst others. For this reason, the first informal debate on disaster risk reduction was convened in February 2011 under the auspices of the UN General Assembly President, Joseph Deiss, with support from the UNISDR (UNISDR, 2015:1).

South Africa, as a member in good standing of the UNCHR, is expected to comply with Article 6 of the UNCHR as reflected above. Failure to adhere to Article 6 of the UNCHR may lead to litigation and could be very costly for the South African Government. According to Wisner *et al.* (2012:64), the state has a legal obligation to respect, protect and fulfil the right to life of all who are within the borders of South Africa (Article 6 of the UNCHR). It is irrelevant whether the threat arises from natural

or anthropogenic hazards or whether that threat is from within borders its borders or outside (Wisner *et al.,* 2012:64).

To illustrate this point, the civil case of *Budayeva and others vs the Russian Government* in 2008 could be used as supportive arguments for the discussion above. Vladimir Budayeva and others (Budayeva, 2008:3-43) were affected by mudslides in the Russian town of Tyrnauz where they lived. In spite of repeated mudslides affecting the town, the government failed to make adequate provision to protect the communities from this recurring hazard (Budayeva v Russia, 2008:3-43).

According to the court judgement between Budayeva v Russia (2008:3-43), on one occasion when there was an imminent threat of mudslides, the metrological institute sent warnings to the state and the vulnerable communities warning them of the impending danger. In spite of this warning, the government did not institute appropriate mitigating measures, and two weeks later, there was a massive mudslide. When the government did take action, it was too little, too late and consequently there were a few casualties.

Subsequently, the communities sought recourse from the court. Unfortunately for the government, the court found that the Russian authorities had failed to take adequate reasonable steps timeously, as well as to plan and implement mitigating measures to protect the community from this hazard (mudslide). The survivors and the relatives of the deceased were paid exorbitant amounts of money, as compensation by the Russian government, for failing to take reasonable measures to protect and fulfil the "right to life" of this specific community. Sadly, the next day, when it was safe to return home, Budayeva went into the house there was another mudslide. It collapsed and she died inside (*Budayeva v Russia*, 2008:3-43). This case is of great significance, especially in the South African context where many thousands of poor people are vulnerable and exposed too many similar hazards such as informal settlement fires, drought and flash floods.

For instance, in South Africa, between 1980 and 2010, there were 77 recorded disasters, affecting 18 456 835 people, 1 869 deaths and R3,394 billion in economic damages (PreventionWeb: Disaster Statistics: South Africa, (2011:1-4)
Available: www.preventionweb.net Accessed 2014).

According to the UNHRC, states have a legal obligation to respect, protect and fulfil the rights to live, whether the threat arises from natural or man-made hazards. Since South Africa is a signatory to the United Nations Commission on Human Rights, the South African government may find itself open to litigation if the courts find in favour of the communities, since disasters of such magnitude often occur in South Africa (Wisner *et al.,* 2012:64).

However, it must be noted that South Africa is vulnerable to humanitarian disasters because of its close proximity to eight neighbouring African states. The reason for its vulnerability is that South Africa's economic situation is far better than that of some of its African counterparts, with a well-developed infrastructure and political stability. Since many African countries are politically unstable, war-ridden and experience many economic hardships, South Africa provides a safe haven for a better life. The migration of communities into South Africa in search of a better life exposes the South African government to vulnerabilities (UNISDR, 2015:4-7).

According to the UNISDR (2015:4-7), some of the illegal migrants are forced to build houses of low quality (informal settlements) that are prone to fires and floods close to urban areas. This is because it is close to where the migrants seek work. Therefore, if South Africa is caught lacking regarding human rights abuses, the South African government will encounter a backlash from the global community. Any constitutional human-rights infringements by the South African government may be viewed as a violation of its own internationally recognised (UNISDR, 2015:4-7).

4.3. INTERNATIONAL STRATEGIES OF DISASTER MANAGEMENT, RISK REDUCTION, RISK ASSESSMENT

The various international strategies of Disaster Risk Management, Risk Reduction and Risk Assessment are outlined below.

4.3.1 United Nations International Strategy for Disaster Reduction (UNISDR)

The UN General Assembly declared the 1990s as the International Decade for Disaster Risk Reduction (DRR). The aim was to decrease the loss of life caused by natural disaster, specifically in developing countries. During 1994, the first world

conference on DRR took place in Japan where the Yokohama Strategy for a safer world was adopted. The Yokohama Strategy adopted strategies for natural disaster risk prevention and mitigation. During 1999, the International Strategy for Disaster Risk Reduction (ISDRR) was announced by the United Nations Economic and Social Council and adopted by the United Nations General Assembly. The International Strategy for Disaster Reduction (ISDR) serves as an international framework for responding to increasing events and the scale of disaster (UNISDR, 2015:4-7).

It also serves as a focal point within the United Nations to coordinate disaster reduction and to create synergy among the disaster reduction activities of the United Nations. The International Strategy for Disaster Reduction (ISDR) builds on the International Decade for Natural Disaster Reduction and the Yokohama Strategy and plans of actions. Further mandates of the International Strategy for Disaster Reduction (ISDR) includes promoting public awareness and commitment; to expand coordination and partnerships; to improve the knowledge about the causes of disasters; and options to risk reduction (UNISDR, 2015:4-7).

4.3.2 The Hyogo Framework for Action (HFA), 2005-2015

The Hyogo Framework for Action (2005-2015) building the Resilience of nations and Communities to Disaster was adopted at the Second World Conference on Disaster Risk Reduction during 2005. The HFA (2005 to 2015) is a global agreement that was signed by more than 180 countries to promote and support disaster risk assessment and other related processes. The aim of the HFA (2005-2015) was to serve as a guiding document in strengthening and to promote international cooperation to ensure that disaster risk reduction is used as a foundation for sound national and international development. Since the adoption of the HFA (2005-2015), countries have enhanced their capacity concerning Disaster Risk Management. Therefore, the HFA (2005-2015) serves as an important framework for increasing public and institutional awareness, generating political commitment and to focus and catalysing actions by a wide range of international stakeholders at all levels (UNISDR, 2015:6).

4.3.3 Sendai Framework for Disaster Risk Reduction 2015–2030

The Sendai Framework for Disaster Risk Reduction 2015–2030 was launched in March 2015 at the third United Nations World Conference on Disaster Risk Reduction that took place in Sendai, Japan. The Sendai Framework for Disaster Risk Reduction (2015–2030) is the successor to the Hyogo Framework for Action (2005-2015), which expired in 2015. The Sendai Framework for Disaster Risk Reduction (2015–2030) serves as the first major agreement of the post-2015 Development Agenda and it consists of seven global targets and four priorities for action. According to UNISDR (2015:10-11), the Sendai Framework for Disaster Risk Reduction (2015–2030) is guided by the following principles:

- The primary responsibility of each state is to prevent and recue disaster risk through international, regional, and bilateral cooperation.
- The responsibility of disaster risk reduction should be shared by central governments and appropriate role-players. However, it requires the empowerment of local authorities and local communities to reduce disaster risks including through resources and decision-making responsibilities.
- The aim is to manage the risk of disasters by focusing on the protection of persons and their property, health, livelihoods and productive assets, including cultural and environmental assets while promoting and protecting human rights of all people including the right to development.
- It requires the cooperation and coordination of governments and all relevant stakeholders as well as by paying attention to people disproportionately affected by disasters.
- Risk reduction and management further require a clear articulation of responsibilities across public and private stakeholders
- Disaster risk reduction is an imperative to achieve sustainable development. Therefore, the development and implementation of relevant policies, plans, and mechanism aimed at coherence across sustainable development and growth, food security, climate change, environmental management, safety and health and disaster risk agendas should be a priority in all states.

- Disaster-risk reduction drivers should include national, regional global and local levels, but it has a specific local characteristic that must be understood for the determination of measures to reduce disaster risks.
- Increasing public education and awareness of disaster risks is an imperative to reduce disaster risk.
- The strengthening of international cooperation across states is essential for effective Disaster Risk Management.
- Developing countries have specific disaster risk challenges; therefore, these countries need support such as finances, technology transfers, and capacity-building initiatives from developed countries as required.

In the development of the South African DRM policies such as DRMF (2005) and DMA (2002), the above principles of the Sendai Framework (2015–2030) were incorporated.

4.4 DISASTER RISK MANAGEMENT FRAMEWORKS

For the purpose of this study, the researcher discussed the most important South African as well as the International Disaster Risk Management Policy Frameworks and models. The purpose of this discussion was to establish which elements would be applicable in the development of the proposed integrated DRM model.

4.4.1 International policy frameworks of Disaster Risk Reduction

Table 4.1 below shows the International Policy Frameworks of Disaster Risk Reduction.

UNISDR 1999, HFA 2005 and Sendai Framework of 2015, the international policy frameworks provide guidelines for countries to develop their individual Disaster Risk Management strategies. The above international disaster risk reduction frameworks have been developed progressively and over each period, achieving small positive milestones. The reason for this is that not all counties face the same disasters, with the intensity and frequency. In addition, their impact also differs considerably, adding to social, economic and environmental losses ranging from minor to challenging proportions (UNISDR, 2015).

4.4.2 National Policy Framework: The South African Disaster Management Framework, 2005

The NDMF (2005) provides for guidelines to be developed within its borders. In this regard, provinces and local municipalities are advised to develop their individual DRM frameworks, which should be the foundation on which their DRM plans are based. This is a model framework for DRM in South Africa. Moreover, it provides for provinces and municipalities to develop models based on this framework (NDMF, 2005:148). It comprises four key performance areas to be achieved using the three enablers (NDMF, 2005:148).

4.5 MODEL FRAMEWORKS

The Cause and Effect models are essentially frameworks designed as models, but provide guidelines and advice from which to manage disaster risks. Moreover, they provide a context for understanding the causal factors of disasters. Some examples of these model frameworks are the Pressure and Release (PAR) model, Cause and effect model and the Disaster Risk Management Framework (DRMF)as discussed by Nojavan *et al.* (2016:1855-6) and Baas *et al.* (2008:7). In this regard, the framework is designed as guidelines for regions and countries that are continuously faced by various forms of disasters (Baas *et al.,* 2008:7).

For the purposes of this study, a comparative analysis of the South African Disaster Management Framework (NDMF, 2005) and Disaster Risk Management Framework model proposed by Baas *et al.* (2008:7) were analysed.

4.5.1 International and national models for Disaster Risk Management

The Manitoba Health Disaster Management Programme defines a Disaster Risk Management model as a visual representation of a cyclic process that starts with a strategic plan and ends with monitoring and evaluation. Thus, it is made up of several independent elements, each of which has been assigned related, but specific responsibilities. Consequently, these responsibilities must be carried out effectively for acceptable Disaster Risk Management services. Inevitably, the model will serve its intended usefulness and purpose (Manitoba Health Disaster Management, 2002:15).

Thus, a model may be regarded as conceptual idea or physical construction. A conceptual (idea) model is conceived in the mind and is intangible. The physical or practical model, on the other hand, may be the actual drawing of the model or a physically constructed example and which is tangible. Furthermore, models may be developed from international and national guiding policy frameworks such as the United Nations International Strategy for Disaster Reduction (UNISDR, 1999), the Hyogo Framework for Action (2005), or the Sendai Framework for Disaster Reduction (2015) that will be outlined below.

In Table 4.1 below examples of the policy and model frameworks of Disaster Risk Management are outlined.

The first column in Table 4.1 outlines three International Frameworks, the United Nations International Strategy for Disaster Reduction (UNISDR 1999), The Hyogo Framework for Action (HFA) 2005-2015 and the Sendai Framework (SF) for Disaster Risk Reduction 2015–2030.

Table 4.1 Examples of the policy and model frameworks

International policy frameworks	**South African policy framework**	**International model frameworks**
United Nations International Strategy for Disaster Reduction (UNISDR 1999). The Hyogo Framework for Action 2005-2015. Sendai Framework for Disaster Risk Reduction 2015–2030	The South African Disaster Management Framework (NDMF, 2005).	Cause and Effect models (are frameworks) Examples are: Pressure and Release (PAR) model, Crunch model and Access model, Littlejon six-stage model and Disaster Risk Management Framework model (Baas *et al.,* 2002:8).

(Source: Researcher's own interpretation)

These international frameworks indicated in Table 4.1 provide broad guidelines for countries to develop their country and regional disaster risk management policies. For instance, the second column in Table 4.1 shows The South African Disaster Management Framework (NDMF, 2005), which has been developed for use in South Africa. The NDMF was developed using the UNISDR (1999), the HFA (2005) and the

SF (2015). Countries or regions are required to use these international guiding policy frameworks as alluded to above, to develop their own DRMF. However, when using these policy frameworks to develop individualised frameworks, countries must consider their own specific conditions and circumstances.

The next section will discuss the purpose of models.

4.6 PURPOSE OF MODELS

A well-designed model makes it easier to develop and implement strategic policy decisions. Moreover, a high quality model will go a long way to achieve the intended purposes for which the model was designed. Pine (2015:60) stresses the importance of understanding how Disaster Risk Management models function so that the purposes for which they were designed are successfully met. One of the main purposes of a Disaster Risk Management model is to avert large-scale social and economic losses (Pine, 2015:60-61).

In this regard, a model reveals the relationship that exists amongst the different variables that connect them. Importantly, these relationships have the potential to influence the development of management theories in this field, and consequently the discipline. In this way, evolving theories may lead to the refinement of past and current models and in this way, alternative models are developed, which then leads to the creating of new knowledge.

Kelly (1998:25) advocates that a Disaster Risk Management model can assist to understand complex activities by differentiating between critical elements such as preparedness and mitigation measures on the one hand, and response and recovery on the other. In this respect, response refers to the promptness of setting the rescue operation in motion. The quicker the response, the better the chances of saving lives, as opposed to a delayed response, which may be tragic. Therefore, the usefulness of critical elements of a model, such as response and recovery, and consequently the purpose of models becomes more apparent (Kelly 1998:25 in Asghar *et al*., 2006:1).

In addition, Reid and Van Niekerk (2008:246) contend that all stakeholders must have a common understanding of all the elements that make up the multiagency response

management system (MARMS). In other words, everyone involved in the operations of a model must work harmoniously to achieve objectives of a similar level. Thus, the MultiAgency Risk Management System (MARMS) is a South African Incident Management System, which works similarly to other internationally recognised emergency management models. Moreover, the MARMS emphasises a unifying approach by organisations in pursuit of effective Disaster Risk Management. Furthermore, the MARMS demonstrates that the DRM officials may also function effectively if there is a common understanding of the various elements such as Operations Management, Hazard Analysis and Risk management. For this reason, it is important to understand the benefits of DRM models (Reid and Van Niekerk, 2008:246).

4.7 BENEFITS OF DISASTER RISK MANAGEMENT MODELS

The NDMF (2005) has been developed based on principles as enshrined in the above international documents. Moreover, the provinces in South Africa are required to develop their framework that must be aligned to the country's NDMF (2005:148).

The South African local municipalities are also required, according to the DMA (2002) to develop their Disaster Management Framework in accordance with the Provincial Disaster Management Framework, which subsequently must comply with the provisions of the South African NDMF (2005). The alignment of the various frameworks is to ensure consistency within the provinces and subsequently in South Africa. To develop the NDMF (2005), International Policy Frameworks such as the UNISDR (2009) and the HFA (2005) were used. However, the Sendai Framework (2015) is the latest and most updated internationally recognised DRM Framework that may be used to develop DRM policies, where necessary (DMA, 2002).

A series of events precede the development of a model. Firstly, the social, economic and/or natural environment is observed to develop a theory from which assumptions are made regarding a phenomenon. These assumptions are then, used to conduct studies regarding the phenomenon in question. Thereafter, the findings are used to develop a consolidated model. For this reason, Pine (2015:60) argues that most models are based on empirical findings in a specific environment and context. Consequently, when the circumstances and the environment changes, researchers

are expected to recraft and modify the original models to accommodate the changes in the environment to ensure the models are relevant (Pine, 2015:60). Since the environmental and other conditions vary, Tables 4.2 summarises how Pine (2015), Kelly (1998), White (2013) view the benefits of models from an international perspective. The South African perspective as adopted by Van Niekerk (2008) is summarised in Table 4.2 below (Pine, 2015; Kelly, 1998; White, 2013; Van Niekerk, 2008).

Furthermore, Kelly (1998, in Asghar *et al.*, 2006:1) states that there are four reasons why models are beneficial:

Firstly, models differentiate between critical elements and those elements that are viewed as less important. In this way, complex events become easier to understand and respond to. This is important when responding to disasters, because officials will understand which events to respond to especially when there is a serious time constraint.

Secondly, the actual disaster situation may be compared to a model with which simulation exercises have been used to practise. When faced with a disaster situation, officials may be able to compare the actual situation with simulations they are familiar with. In this way, the implementation of their plans becomes easier because they have been engaged in simulation activities.

Thirdly, a model will help with the counting and measuring of the impact of disasters. Thus, the quantification of disasters makes the planning for and executing of disasters much easier. Thus, using a model as a management tool for the planning of disasters is made easier.

Fourthly, a model allows for a common understanding of the most important DRM concepts, which will ensure a better integration of relief and recovery efforts because it helps to describe the events as they unfold in the various phases of disaster management. This is important in response and recovery efforts, especially when time is of the essence (Asghar, Alahakoon and Churilov, 2006:1).

According to White (2013:2-22), the use of a DRM model for the purposes of planning for and execution of the disaster risk management activities are important if disaster losses are to be reduced to a minimum. In addition, Sithole (2014) emphasises the importance of communication protocols that DRM models could play for effective DRM since many individual and cluster stakeholder groups are involved in the management of disaster risks (White, 2013: 2-22; Sithole, 2014:290).

The next section discusses the international and national perspectives from which models may be viewed.

4.8 HOW INTERNATIONAL AND LOCAL RESEARCHERS VIEW DISASTER RISK MANAGEMENT MODELS

The next section will discuss how international and local researchers view disaster risk management models.

4.8.1 International perspectives of Disaster Risk Management models

This discussion focuses on an interpretation on how international and local researchers view DRM models. Table 4.2 below illustrates the benefits of DRM models from a viewpoint of two DRM scholars from 1998 to 2015.

Table 4.2 International researchers' viewpoint: Benefits of DRM models

Viewpoint of Kelly, C 1998	Viewpoint of Pine, JC 2015
DRM models help us to simplify complex events by distinguishing between critical elements such as response and recovery (Response time).	DRM models help to visualise complex processes that add to our understanding of social, economic and physical events.
DRM models help us to compare actual conditions with a theoretical model, which is an essential element in quantifying disaster events.	They help us to compare and contrast events, situations, and dynamics of complex systems. They help us to collect and manipulate data.
DRM models help to establish a common base of understanding for all involved.	DRM models could be used as tools in the teaching and learning process especially in the progression of vulnerability in the access model.

(Source: Researcher's own interpretation)

According to Table 4.2 above, there is a 17-year time difference between when Pine (2015:60) and Kelly (1998:25) recorded benefits of models. There are many similarities as well as differences. Pine (2015:60) illustrates that DRM models help to

visualise complex processes, compare and contrast situations, collect and manipulate data, and could be used in the teaching and learning of the progression of vulnerability. Kelly (1998:25) explains that DRM models simplify complex events, compares actual conditions using a theory, and establishes a common base for understand DRM concepts. Both of the DRM scholars agree that DRM models provide meaning and understanding for difficult DRM disaster related concepts (Pine, 2015:60; Kelly 1998:25).

4.8.2 National perspective of Disaster Risk Management models

To obtain a national perspective on the benefits of DRM models, the work of White (2013:125) was compared with that of Van Niekerk (20011:22), as illustrated in Table 4.3 below.

Table 4.3 National researchers' viewpoints: Benefits of DRM models

Van Niekerk (2011)	**White (2013)**
A documented DRM model (MARMS) is a system designed to provide for graduated levels of managing responses across the spectrum of occurrences	Models helps to manage and reduce the risk of disasters
A DRM model provides a seamless environment for integrating and coordinating operational responses.	Models facilitate the planning process
DRM model (MARMS) is useful for tactical and strategic decision-making. In this way, some officials are allowed to take decisions to resolve a situation	Different models have different benefits for e.g. the Crunch model illustrates that the poorest communities are the most vulnerable.

(Source: Researcher's own interpretation)

The time difference between the both researchers, when they made their findings is five years. On the one hand, White (2013:125) concludes that models help in the planning, managing and reduction of disaster risks. On the other hand, Van Niekerk (20011:22) proposes that the MARMS model helps in, integrating coordinating and managing operational responses.

From the above discussion, one may argue that the international perspective focuses on the clarifying of DRM concepts to ensure consensus, while, the national perspective holds that models focus on the management of DRM processes. It could be argued

that the above viewpoint is only a generalisation, since it does not project the views of all the modellers involved in categorising models. Also of note is that there are very few differences, but many similarities amongst the national DRM models. As discussed in Section 4.5.2 of this study, many DRM benefits may be derived from using DRM models.

4.9 CHALLENGES THAT DISASTER RISK MANAGEMENT MODELS PRESENT

According to Reddy (2010:133), the following are challenges that DRM models may present:

Firstly, there is insufficient community participation when developing DRM models for the management of disasters. Since the local people are first respondents to disasters, they must be involved in the development of Disaster Risk Management models. For example, the Community-Based Disaster Risk Reduction models (CBDRRM) can be seen as a way of getting community support for effective Disaster Risk Management (Reddy, 2010:133).

Secondly, for effective Disaster Risk Management processes, a wide range of stakeholders must be involved in all its activities, including in the development of a model itself. In South Africa, many municipalities regard DRM as an add-on activity, and require that DRM activities be carried out to fit into a specific period. In some instances, during this period, not all stakeholders may be available; therefore, DRM activities such as the development of a model may be carried out with only those that are available to participate (Reddy, 2010:133).

Thirdly, the nature of DRM is that it is multidisciplinary and multisectoral. This means that many government and municipal departments should be involved in the management of disaster risks. In this regard, the commitment of officials in positions of authority is lacking, since senior officials do not attend these meetings regularly. As a result, there is lack of continuity and perhaps misunderstanding of how the model supposed to function (Reddy, 2010:133).

According to Van Riet (2012:19), information that is more accurate may be obtained by combining scientific principles with community-based approaches when conducting

disaster risk assessments, for the development of models. Although historical data obtained in this way may form a trend, it should not be relied upon absolutely for future predictions. The reason for this is that circumstances may change due to climate change and other factors (Van Riet, 2012:19).

Thus, the exact cause that apply pressure on a community in some models such as the Pressure and Release (PAR) model may be traced accurately. For example, the degradation of the environment or if low quality materials are used in the construction of buildings such as roads, dams and houses, these facilities will be unsafe and add pressure to a community. Consequently, unsafe conditions that the PAR model identifies could be addressed by adequately lessening the vulnerability levels of the community. This can be done by restoring the environmental conditions and/or improving the quality of material used in the construction of infrastructure (Wisner *et al.,* 2012:87-88).

Similarly, other DRM models such as the Access model demonstrates the vulnerability of the communities due to the lack or absence of economic or political resources. The Access model further emphasises that these resources are very important to ensure a sustainable livelihood. The absence or lack of these resources may make the community either vulnerable or resilient to disasters. In this regard, communities are forced to adapt and become more resilient to these resources. For, this reason, the PAR and Access model demonstrate that there are factors that make the community vulnerable to disasters (Wisner *et al.,* 2012:87-88).

The Access model systematically clarifies the disaster situation as it unfolds. In addition, it demonstrates the interaction between individuals, the aid agencies, the impact, the coping capacity and the recovery strategies involved in the Disaster Risk Management processes. In contrast, the PAR model does not indicate the exact interaction between the community and the factors that apply the pressure on it (Wisner *et al.,* 2012:88-89).

For this reason, Van Riet (2012: 30) contends that if the factors that apply pressure on a community are removed the situation may be reversed. This means that if the factors that make the communities vulnerabilities are removed, the impact can be minimised. By ensuring that mechanisms are in place to make communities and infrastructure

less vulnerable, the impact may be reduced. In this way, these inadequacies may be managed effectively and vulnerability will be reduced as well. Thus, the progression of vulnerability may be reduced or eliminated. Consequently, relying on historical trends for the prediction of disaster risk reduction using these models may not be appropriate (Van Riet, 2012: 30).

4.10 LIMITATIONS OF DISASTER RISK MANAGEMENT MODELS

After extensive research Asghar *et al.* (2011:5) found that DRM models present the following limitations:

- In Disaster Risk Management, most models have only the four main phases: prevention, mitigation, response and recovery.
- No model can include all the major components of Disaster Risk Management within its framework.
- Environmental factors that affect the severity of disasters are not included in most models.
- The full picture of Disaster Risk Management activities is not captured within all models.
- In most of the models, the activities are not organised in a logical order.
- Although evaluation and analysis are key components of mitigation strategies (for future disasters), current models do not consider them.

In the light of the above discussion, it is important for researchers to understand the various perspectives from which the functioning of the elements of a particular model may be understood. Furthermore, the purpose, the benefits, challenges and limitations of a new DRM model must be taken into account if it has to serve its intended purpose effectively.

4.11 CATEGORIES OF DISASTER RISK MANAGEMENT MODELS

DRM models are made up of different elements and present different benefits, characteristics and limitations. After conducting research with thirty different models, Asghar *et al.* (2011:5) grouped models into four categories, namely: Logical models,

Integrated models, Cause models and Other models. This categorisation of the models was based on its structure and composition (Asghar *et al.,* 2011:5).

4.11.1 Category One: Logical models

These researchers cite five examples of Logical models that are in category one. These are the Traditional model, Expand and Contract model, Kimberley's model, Tuscaloosa Emergency model and the Circular model. In this regard, Table 4.4 below summarises the different models and their characteristics.

Table 4.4 Category-One: Logical models

Logical Models	Characteristics of the Model
Iceberg (Heinreich, 1941)	The main feature of this model is its attention to the structure and showing seeming template of model.
Traditional: Sequence of Action (DPLG-2,1998)	The different disaster management phases, rather than in a sequential manner, run parallel to each other, albeit with varying degrees of emphasis.
Expand and Contract (DPLG-2,1998)	The difference with the traditional model, it is also often observed that the sequences of action occur simultaneously.
Circular model of Disaster (Kelly, 1998)	The main feature of this model is its ability to learning from real disasters.
Lechat model (Lechat, 1990)	This model starts with anticipation for disaster and ends at the rehabilitation stage.
Mitroff model (Mitroff, 2000)	This model is a proactive model which emphasise to the learning stage
The five-stage model of Mitroff and Pearson (Mitroff and Pearson, 1993)	This model emphasises the detection and learning phases.
The Four-phases model of Disaster management (Kimberley, 2003)	This model emphasises to emergency management. The most important phase of this model is the response phase
The Four-stage model of Tuscaloosa (Tuscaloosa, 2003)	This model starts with response stage and ends at this stage.
The Two-part model of Disaster management (Hosseini and Jedi, 2006).	A comprehensive and practical model of disaster management includes a series of operational and logistics measures. Therefore, this model is called Two-part model.

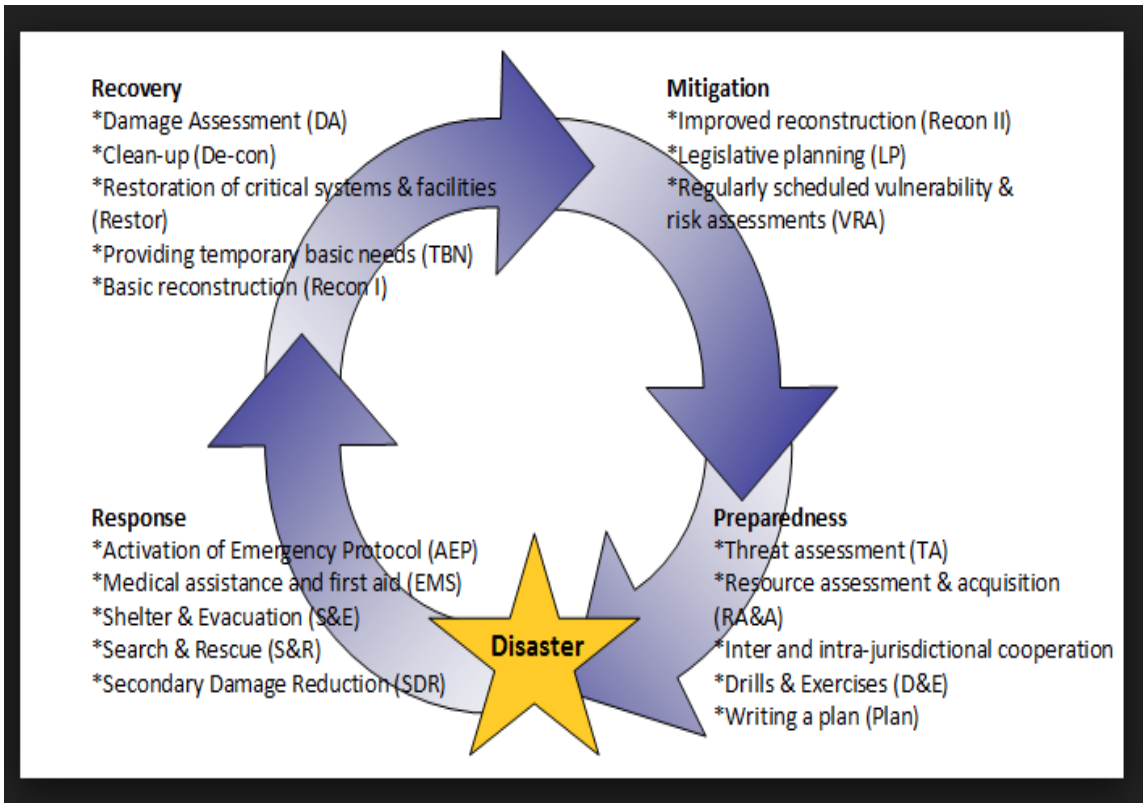
Gupta Stair model (Gupta, 2010)	This model does not pay much attention to pre-disaster phases.

(Sources: Adapted from Asghar *et al.,* 2011)

Asghar *et al.* (2011:5) further state that these categories of models provide a basic description of the different phases (stages) of a disaster. In this regard, there are two distinct phases: the pre-disaster risk-reduction phase (mitigation and preparedness) and the post-disaster, response and recovery phase. Prior to 1941, the focus was on the post-disaster, response and recovery phase focusing on the structure of the model. After 1998, the models were used a learning tool. They emphasised emergency management with operational and organisational issues (Asghar *et al.,* 2011:5).

Figure 4.1 below identifies the four stages and provides a preview of what constitutes the various stages or phases. It further indicates some of the activities that must be considered for effective management of disasters at every stage. In this respect, disaster preparedness refers to the multisectoral activity where prevention, mitigation, response and recovery plans and programmes are developed to manage disasters.

Figure 4.1 The Disaster Management cycle



(Source: Baas, Ramsamy, Pryck and Battista, 2008:7)

Response is the set of activities that is undertaken when a disaster is expected or as soon as it begins. This could include the assessing the situation, limiting further suffering and consequences. This could be done by evacuation, search and rescue, provision of food and water and maintaining law and order. Recovery refers to the repatriation of displaced people to their place of origin, rehabilitation or restoring of basic social functions and recovery of the economy, community and infrastructure. Mitigation refers to developing plans and programmes to reduce the risk of disasters. This could be done by reducing the threats and the causes of threats to the community. This must also include the reduction of vulnerability. In essence, Asghar, *et al.* (2011:7) emphasise that in these category of models, there are four distinct stages as indicated in Figure 4.1 above.

However, Baas *et al.* (2008:7-9) define DRM as a group of activities that is undertaken before, during and after a disaster. These activities are ongoing processes and should be regarded as a continuum as indicated in Figure 4.1 above, rather than isolated activities as in phases. All activities are interrelated, especially in countries that experience disasters regularly and therefore should not be seen in phases, but rather as a continuum. Logical models provide a simple definition of stages and emphasise the basic events and actions, which constitute a disaster (Baas *et al.*, 2008:7-9).

4.11.2 Category Two: Integrated Disaster Risk Management models

The Manitoba and the Weichslgartner models are examples of the Integrated models that reside in category two. Hence, related activities such as hazard assessment, risk management, mitigation and preparedness are organised and linked to ensure effective implementation. After the monitoring function (Quality Improvements) where data are gathered, the strategic planning activities (Strategic Approach) follow. This is where the refinement of the model takes place and this way the integrated models are continuously developed. This is illustrated in Figure 4.2 below as a cyclic process, demonstrating a continuum rather than events in different phases (Nojavan *et al.,* 2016:18).

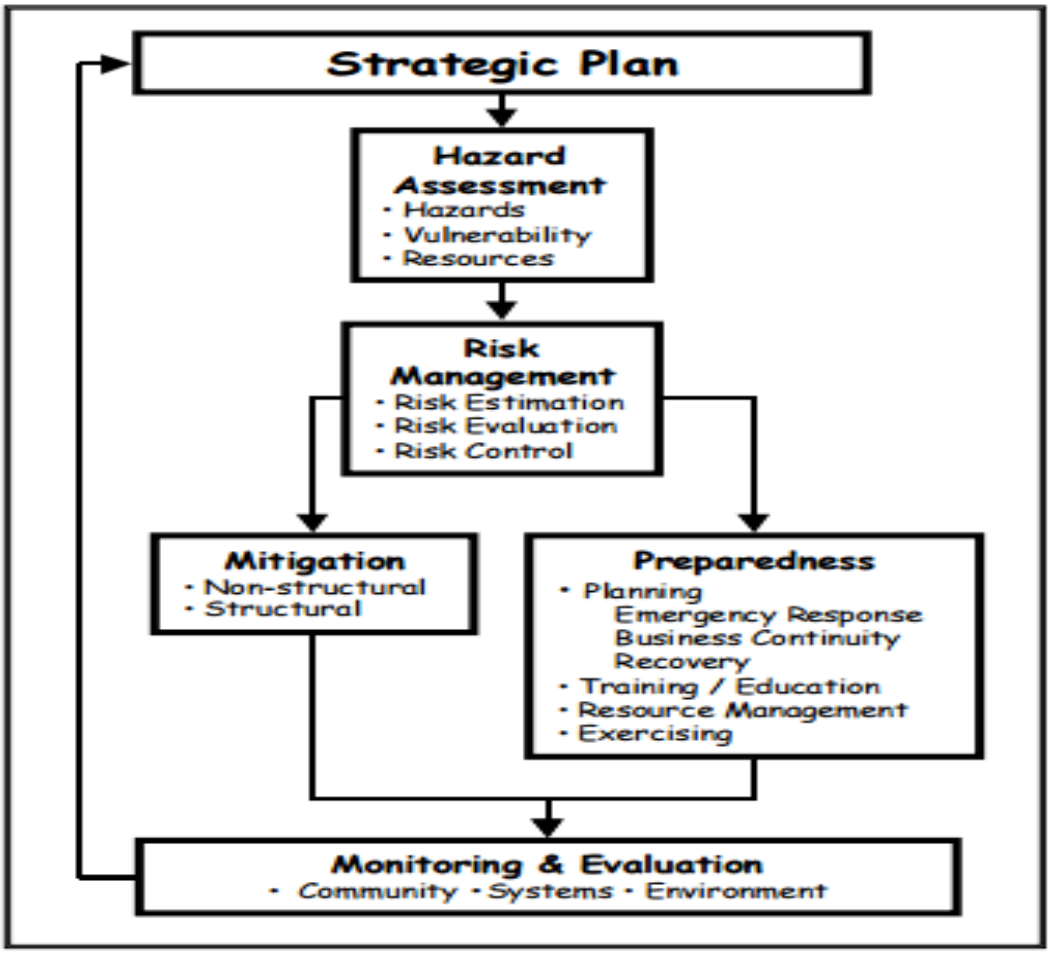
The Manitoba model as indicated in Figure 4.2 below operates in a cycle. It commences with strategic plan and ends with monitoring and evaluation. The roles and responsibilities for each of the elements are established. Thereafter, a hazard

analysis is conducted in a specific context, since hazards manifest differently under different conditions. The hazard analysis sets the background for the risk management process, which involves identifying, evaluating, analysing and finally treating the risk. In this respect, mitigation and preparedness measures are considered as treating the risk (DRM model, 2002:34).

Throughout the disaster management process constant monitoring, evaluation, refinement and improvement takes place. This leads to the initial strategic plan and the cycle continues once more. All of these activities takes place simultaneously in a seemingly circular pattern consequently, the notion of a continuum is emphasised rather than phases (Baas *et al.,* 2008:10). Baas *et al.* (2008:10) are further of the opinion that the Weichselgartner model works on the same principle as the Manitoba model, but it involves conducting analysis of several related but different elements. These elements are natural hazards, exposure, preparedness, prevention, response and vulnerability analysis (Baas *et al.,* 2008:10).

Figure 4.2 below discusses the stages of the Manitoba model. The model starts with the strategic plan, hazard analysis, disaster risk management, mitigation, preparedness, and monitoring and evaluation.

Figure 4.2: Manitoba model showing the strategic planning process



(Source: Disaster Management model for the Health Sector, 2002:34)

4.11.2.1 Hazard Analysis: The hazard identification process is to identify and classify hazards into community, economic and natural assets. These hazards are then analysed and mitigation programmes developed to prepare communities to mitigate against disasters. It involves vulnerability assessment, which is the degree of exposure of human population, critical facilities and/or the environment to the hazard. (Pine, 2015:10).

Hazard-analysis risk analysis, which is conduced to understand the consequences of the impact of the hazards on vulnerabilities better, which are people and infrastructure. This involves analysing the (probability) likelihood and severity should the disaster occur (Pine, 2015:10).

4.11.2.2 Disaster Risk Management: Chapter 1, Section 1(b) of the DMA (2002) defines Disaster Risk Management as a continuous, integrated, multisectoral,

multidisciplinary process of planning and implementation of measures to prevent or reduce the risk of disasters; mitigate the severity or impact of disasters; plan for emergency preparedness; rapid and effective response to disasters; and make provision for post-disaster recovery and rehabilitation measures. In addition, the NDMF (2005:228) identifies the term Disaster Risk Management as an all-encompassing definition referred to in the DMA (2002).

4.11.2.3 Mitigation: The NDMF (2005:231) defines disaster-risk mitigation as the structural and non-structural measures undertaken to limit the adverse effects of natural hazards, environmental degradation and technological hazards in vulnerable areas, communities and households. This definition of mitigation as embraced by the NDMF (2005:231) is a narrower version of the definition provided by the DMA (2002). The definition as espoused by the NDMF (2005:231) seeks to give more impetus to what the practitioners ought to do in their planning and preparation of their disaster mitigating measures. Furthermore, The United Nations Office for Disaster Risk Reduction (UNISDR) defines mitigation as “the lessening or limitation of the adverse effects of hazards and related disasters” (UNISDR, 2009:10).

4.11.2.4 Preparedness: Disaster preparedness refers to all the planning activities undertaken to respond appropriately to manage the negative impacts of a disaster. Thus, preparedness includes evaluating the risk, adopting standards and regulations for quality assurance purposes, especially in infrastructure development. This also ensures that all resources are readily available and brought together to organise communication programmes (Sendai Framework, 2015:56).

4.11.2.5 Monitoring and Evaluation: Monitoring and evaluation is an important factor for effective Disaster Risk Management. The absence of an effective monitoring and evaluation system may have severe consequences on a specific community and/or its economy. In this regard, a model must start with a strategic planning session and end with monitoring and evaluation as suggested by the Manitoba model.

In Table 4.5, the different Category-Two Integrated DRM models are illustrated. There are eight Category Two Integrated DRM models. Their characteristics are also discussed below.

Table 4.5 Category-Two: Integrated DRM models

Name of model	Characteristics of the model
Manitoba model (Manitoba, 2002)	Advantages and features of this model are to establish a balance between preparation and resilience in order to respond the specific needs of the disaster.
MacConkey Linear (MacConkey, 1987)	The MacConkey model pays special attention to pre-disaster management in four stages.
Deming Cycle model (Aguayo, 1991)	The PDCA cycle, with the continuous improvement cycle of plan, do, check and act was advocated after World War II.
Weichselgartner Integrated model (Weichselgartner, 2001)	The overall objectives of this model are the assessment of probable damage and the planning of future measures to reduce this damage. It is argued that the assessment of vulnerability will not reduce natural hazards singly. Therefore, all done measures should be surveyed, analysed and reviewed constantly. The model illustrates the process cycle and the integration of geographic placed-based concepts in disaster management.
Onion model (Mitroff *et al.,* 1978)	This model provides a framework for preparing organisations in crisis.
Integrated model of Moe and Pathranarakul (Moe and Pathranarakul, 2006)	The results of this model show that importance of proactive and reactive strategies in natural disaster management.
McIntyre Integrated model (McIntyre *et al.,* 1978)	An integrated approach for modelling the vulnerability should consider social science research, engineering and physics simultaneously.

(Source: Adapted from Asghar *et al.,* 2011)

Table 4.5 above illustrates the characteristics of the Manitoba model, the MacConkey model, the Weichselgartner Integrated model, the Onion model, the Integrated model of Moe and the Pathranarakul model and the McIntyre model.

A Category-Two Integrated Disaster Management model is a means of organising related activities to ensure their effective implementation. The four main components of these models can be identified as Hazard Assessment, Risk Management, Mitigation and Preparedness. Since disasters are events of high levels of uncertainty, the integrated DRM model allows for a better balance between flexibility and preparedness (DRM Manitoba model, 2002:14).

4.11.3 Category Three: Cause and Effect model

The1950s and 1960s in South Africa were marked by the apartheid state's tight control over the political, economic and social structures of the country. In contrast, the 1970s was a period during which the apartheid state began to show clear signs of weakness and disintegration. The nature and scale of the resistance during those two periods were quite different. The re-emergence of resistance politics during the early 1970s reflected a fundamental crisis in South African society. This crisis was both economic and political in its origins (Makgoba, 2016:1-4).

Thus, the exclusion of the masses from the mainstream of the economy (the cause) which resulted in the violent protests the (effect) may be compared to the manner in which the Cause and Effect models function. The Cause and Effect model demonstrates that an underlying cause may be the trigger to a disaster. For this reason, the Category-Three models such as the Crunch model, Access model and the Pressure and Release model (PAR) suggest that there are some underlying causes to disasters. This category of models is not characterised by specific stages, but identifies the root causes of disasters. The Cause and Effect model is a framework developed to understand the root causes of disasters. These models identify the factors that expose a community to identified imminent disasters. For this reason, the communities are vulnerable to specific factors that are identified by the Cause and Effect models demonstrated by the example in Figure 4.3 below.

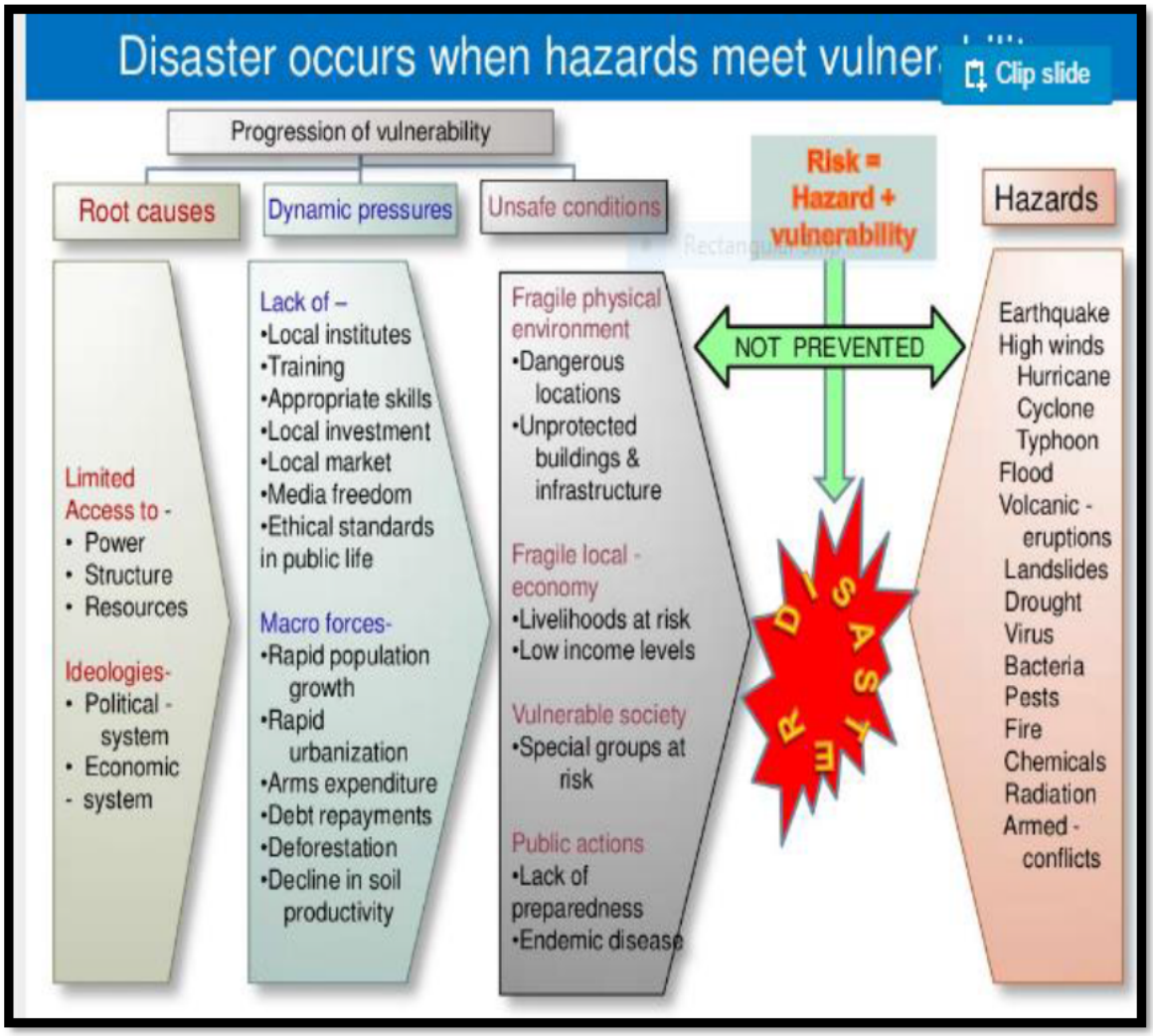
This suggests that there are some underlying causes of disasters. Some examples in this category are the Crunch model, Access model and the Pressure and Release model (PAR). These categories of models are not characterised by specific stages, but identify the root causes of disasters. In this regard, the Cause and Effect model is a framework developed to understand the root causes of disasters. These models identify the factors that expose the community to identified imminent disasters. Thus, the communities are vulnerable to specific factors that are identified by the Cause and Effect models.

Consequently, the progression of the vulnerability can be measured. Since the factors that cause the community to become vulnerable, can be identified by this model, it is also possible to mitigate against such vulnerabilities; hence, the economic and political

crisis of the 1970s and 1980s in South Africa, which were both economic and political in its origins made many communities vulnerable. Therefore, by using this model, Disaster Risk Management officials may be able to identify the root causes and put in place programmes to minimise the impact of disasters (Makgoba, 2016:1-4).

4.11.3.1 The Pressure and Release Model (PAR): Another Category-Three, Cause and Effect model is the PAR model, which is illustrated in Figure 4.3 below. The PAR model is an example of a Cause and Effect model, which emphasises that risk is a function of hazard and vulnerability. This means that some underlying forces (root causes) apply pressure on a community, creating unsafe conditions that which is demonstrated in Figure 4.3 below.

Figure 4.3 The Pressure and Release model (PAR model)



(Source: Wisner *et al.*, 2006:62)

As illustrated in Figure 4.3, the root causes are limited access to power, structure and other resources as indicated, which could be related to political ideologies or economic systems. For this reason, some communities endure the worst municipal services due to differing political affiliations. Secondly, dynamic pressures can be caused by conditions at either macro or micro level such as rapid population increase/decrease and/or lack of appropriate institutions, appropriate skills. These social changes cause stress to a community, which emanates from within a system (Wisner *et al.,* 2012:62). Thirdly, unsafe conditions are created by the physical environment and the socio economic conditions in which a community resides. This could be unprotected buildings and infrastructure on the one hand, and inadequate health facilities on the other. These unsafe conditions are found within human systems. In this way, unsafe conditions are created by making the environment fragile (Wisner *et al.,* 2016:62). Thus, if unsafe conditions are not adequately addressed, it can be regarded as a disaster in waiting. Since the Pressure and Release model is influenced by internal and external factors, the impact on a community will vary from one place to another since these models are site specific.

In addition, the root causes, the dynamic pressures and unsafe conditions are the underlying driving forces that expose the vulnerabilities of communities. Consequently, vulnerability is associated with these forces at three progressive levels such as vulnerability of people because of low socio-economic conditions, high levels of poverty and very little support (Wisner *et al.,* 2012: 62).

Table 4.6 below illustrates the characteristics of a few Category-Three Cause models

Table 4.6 Category-Three: Cause models

Name of Model	**Characteristics of the Model**
Pressure and Release (PAR) model (Blaikie *et al.,* 2005)	The PAR model uses preventative measures to reduce disaster risks.
Crunch Cause model (ADPC, 2000).	This model is a causal model that provides a framework for understanding the causes of the disaster and its structure is formed by the following equation: Disaster Risk is determined by multiplying the hazard with the vulnerability.
Littlejon Six-Stage model (Littlejon, 1983)	The Littlejon Six-Step model is a framework that provides basic directives for disaster management.

Fink's Comprehensive Audit model (Fink, 1986)	This model determines what events could cause a crisis in each functional area. Once scenarios are developed, action plans should be prepared.

(Sources: Adapted from Asghar *et al.*, 2011)

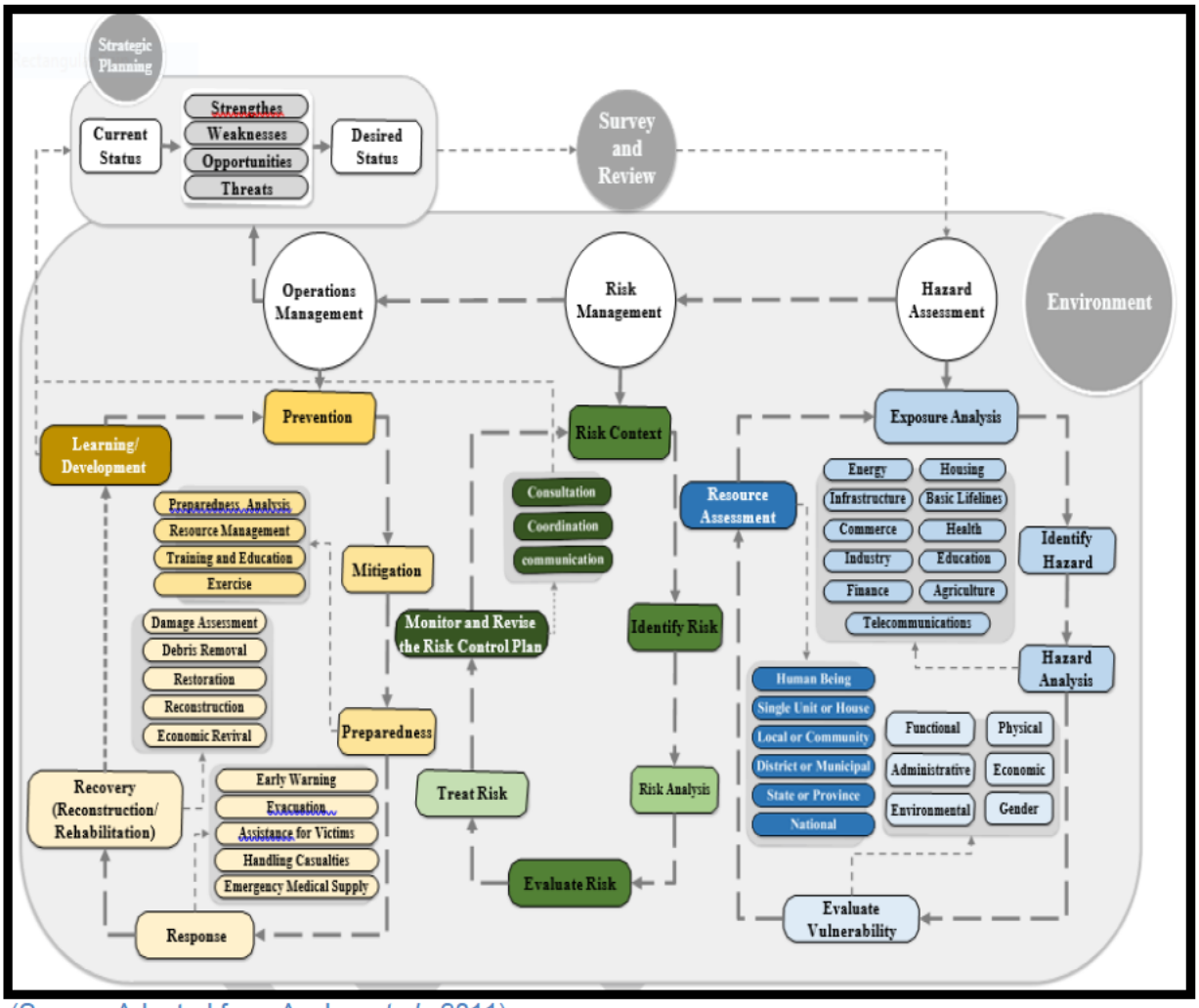
Table 4.6 above shows that during the 1980s, the Littlejon Six-Stage model and the Fink's Comprehensive Audit model were developed. These disaster management models were used as guidelines that were followed in DRR attempts. Disaster scenarios that were created for training purposes were also used to develop response and recovery plans. About 22 years later, between the years 2000 and 2005 the Pressure and Release (PAR) and the Crunch Cause models were developed. The Par model focused on the prevention of disasters whilst the Crunch Cause model provides a framework for understanding disasters better.

The main characteristics of the PAR, the Crunch Cause, the Six-Stage and Fink's Comprehensive Audit model are Category-Three Cause models, which are not based on the idea of defining stages in a disaster. Furthermore, these Category-Three Cause models suggest that there are some underlying causes of disasters and provide guidelines for DRM officials to develop their management plans and strategies accordingly. For this reason, the main elements of the Crunch Cause and PAR models was used to develop the integrated model for the Free State Province. The reason for this is that many socio-economic ills such as poverty, HIV/AIDS and unemployment are the main underlying factors that make communities vulnerable to disasters.

4.11.4 Category-Four: Combinatorial Models

Figure 4.4 below demonstrates the characteristics of a Combinatorial model. The Combinatorial model shows the key elements, namely Operations Management, Hazard Analysis and Risk Management. These three elements form the cornerstone of any Disaster Risk Management system.

Figure 4.4. Category-Four: Combinatorial DRM models



(Source: Adapted from Asghar *et al.*, 2011)

The DRM models of Category Four known as combinatorial models have been developed by combining elements of category one, two and three models (Logical, Integrated and cause models), as illustrated in Figure 4.4 above.

All DRM models are unique, because they function differently, are made up of diverse characteristics, present their own benefits and challenges. Conversely, they also share common features and characteristics (Nojavan *et al.*, 2016:14).

Thus, common features of logical, cause and integrated DRM models were merged to form a new DRM model called the combinatory model. One of the examples of the combinatorial model is the Cunny Comprehensive model shown in Figure 4.4 above. According to Nojavan *et al.* (2016:14), some models focus only on the management aspect of disasters, which is found in the Traditional, Expand and Contract, Kimberley

and Kelly models. Moreover, another group of DRM models focused on risk management. Examples of these are the Statoil, Octopus and Littlejohn. The last group of DRM models focused on hazard assessment and examples of these are the Onion, Pagoda and the Gonzalez Herrero and Pratt models. All three groups of DRM models focused on only one of the dimensions; either Risk Assessment, Hazard Analysis or Operations Management. For this reason, they are regarded as one-dimensional DRM models.

Apart from one-dimensional DRM models, the two-dimensional DM models focused on Operations Management and Risk Management, such as the Mitroff, Moe and Pathranarakul DRM models. Inasmuch as these were proactive DRM models, their emphasis was mainly in the Operations and Risks Management and therefore were classified as two-dimensional by nature (Nojavan *et al.,* 2016:14-26).

However, the three-dimensional DRM models focused on all three of the main elements that make up a comprehensive DRM model. These elements are Risk Analysis, Hazard Analysis and Operations Management, which makes it multidimensional and therefore classified as three-dimensional. Although Nojaven *et al.* (2016:14-26) studied a total of 30 different DRM models, only the Cunny Comprehensive DRM model focuses on Hazard Assessment, Risk Management and Operational Management.

Table 4.7 below also illustrates the characteristics of the Category Four (Combinatorial) DRM models showing the main elements of Operations Management, Hazard Analysis and Risk Management.

Table 4.7 Category-Four Combinatorial models

Name of model	**Characteristics of the model**
Disaster Risk Management Framework (DRMF) model (Baas *et al.,* 2008)	This model has the following three steps: Risk Reduction, Emergency Response and Recovery
Risk Management model (Zimmerman and Stossel, 2011; PDMCA, 2013).	The objective of this model is the increment of community resilience and risk reduction using combination of logical and integrated models.

Risk Management Proactive model (Australian Development Gateway, 2008)	This model tries to combine logical and integrated models. A model of risk that is scalable to any size project or program and easily deployable as the risk management approach built into any product development or project management life cycle.
Wheel Shape Disaster Management model (Roshandel Arbatani *et al.,* 2008).	One of the comprehensive disaster management models is the wheel shape model, which is based on the life cycle of disaster and crisis, as well as its various stages. Also, it is formed by combination of logical and integrated models.
Cunny Comprehensive model (Cunny, 1998).	Cunny proposed a cycle for disaster management, which is one of the complete cycles. This model considers administrative and management measures, which are necessary in disaster management using combination of logical, integrated and cause models.

(Source: Adapted from Asghar *et al.,* 2011)

Nojavan *et al.* (2016:14-26) studied over 30 models and found that the Cunny Comprehensive model accommodates all the important components in its structure for effective Disaster Risk Management. This includes the three dimensions: Operations Management, Risk Management and Hazard Assessment with all the sub-components as outlined in Figure 4.4 above.

Figure 4.4 above emphasises the most important characteristics of the Category-Four Combinatorial models. These Risk Management models focus on the increment of community resilience and risk reduction by using a combination of various logical and integrated models.

Between 1998 and 2013, various Combinatorial models were developed. The 1998 models stress the life cycles of disasters, which is illustrated by the (DRMF) (Figure 4.4) which focuses on risk reduction, emergency response and recovery as the life cycle of disasters. Identifying the cycles in the earlier years (1998) assisted in the effective administration and management of disasters. However, the 2013 combinatorial models were logical and integrated models and unlike the earlier 1998 version of the combinatorial models, these focused on increased community resilience and risk reduction.

4.11.5 Category Five: Other Disaster Risk Management models

Finally, in the fifth category, the other models are DRM models that do not fit into any of the other categories specified above. Some examples of Category-Five models (Other models) are the Ibrahim *et al.* model, which represents the pre-disaster stages of technological disasters; the Fink Model, which includes the prevention strategies; and the Statoil model, which is a reactive Disaster Management model.

Table 4.8 Category Five: Other Disaster Risk Management models

Name of model	Characteristics of the model
Ibrahim *et al.* model (Shaluf *et al.,* 2003, Ibrahim *et al.,* 2003a)	This model represents the technological disaster precondition stage
Gonzalez Herrero and Pratt model (Gonzalez Herrero and Pratt, 1996)	This model states that with the pre-disaster measures, we can change the consequences of the crisis
Fink model (Fink,1986; Penrose, 2000)	This model includes prevention components and crisis analysis
Statoil model Statoil, (2013)	This is a reactive model due to starting the activities after the occurrence of disaster and lasting to the returning and the condition to the pre-disaster normal condition.
Pagoda model (Okada, 2004)	The city has been considered as a vital five-stage system in this model.
Octopus model (Shi *et al.,* 2011).	Since disasters have complex systems, mutual risk management should be based on multidimensional system for achieving success from policymaking viewpoint. This model is proposed based on this viewpoint.

(Source: Adapted from Asghar et al., 2011)

Table 4.8, Category Five, which is grouped into the category, Other models, shows that the Fink model is the oldest Category-Five model, since it was developed in 1986 and the Statoil Model is the latest, developed in 2013. The Fink Model emphasises the pre-disaster prevention and mitigation measures. It also focuses on the analysis of the crisis situation. The Statoil model is a reactive model because it begins with rescue and recovery activities that take place after a disaster occurs. However, the response activities continue to the pre-disaster stage until normalcy has been restored.

From Table 4.8, it can be concluded that, although models have been categorised according to common characteristics they are vastly different in their approach, principles and characteristics. Thus, hazard specific models are developed for specific countries, which may not be applicable anywhere else and they may be modified to suit country specific needs. According van Niekerk (2005:167), disaster statistics are on the increase in some countries and therefore there is an emphasis on emergency preparedness rather than on Disaster Risk Management (Van Niekerk, 2005:167).

4.12. DISASTER RISK MANAGEMENT MODELS PRESCRIBED BY THE NATIONAL DISASTER MANAGEMENT FRAMEWORK (NDMF), 2005

To achieve the aims and objectives of the National Disaster Management Framework, (2005), any DRM model that is designed must comply with the provisions of the DMA (2002), which provides for an integrated and coordinated Disaster Risk Management policy (NDMF 2005:20). For this reason, the NDMF (2005:20) stipulates that any disaster management plan must take into consideration the four Key Performance Areas that must be achieved using three enablers. The Key Performance Areas are:

- Integrated Institutional Capacity for Disaster management
- Disaster Risk assessment
- Disaster Risk Reduction
- Response and recovery

Furthermore, these KPA must be achieved using the following three enablers:

- Information Management and Communication
- Education, training. Public Awareness and Research and
- Funding arrangements for Disaster Risk Management (NDMF, 2005:20).

For the purpose of this study the four key performance areas namely, integrated institutional DRM capacity, disaster risk assessment, risk reduction and response and recovery must be considered with the development of the DRM model for municipalities in the Free State Province. The NDMF (2005:20-21) provides guidelines on how these enablers may be used to achieve the key performance areas.

4.12.1 Characteristics of models provided for by the National Disaster Management Framework, 2005

The NDMF (2005:9-136) emphasises seven different disaster management models which should assist a national, provincial and/or municipal Disaster Management Centre of unit to achieve most of the objectives provided in the DMA (2002). These models and their major characteristics are illustrated in Table 4.9 below.

In addition, Table 4.9 Column 2 outlines the various disaster management models, which are reflected in NDMF (2005). The third column reflects whether the disaster management models are one- or multidimensional. The one dimension refers to the one aspects of Disaster Risk Management that the models focus on and the multidimensional disaster management models reflected above are actually models that emphasise two important aspects of Disaster Risk Management, also referred to as two-dimensional models. However, the proposed integrated Disaster Risk Management model for this study focuses on three important aspects of Disaster Risk Management: Operations Management, Hazard Analysis and Risk Management and therefore it may be referred to as a three-dimensional or multidimensional model.

Table 4.9: Characteristics of models from the Disaster Management Framework, 2005

Model No	Name of model	Dimension	Characteristics	NDMF 2005: Page No
1.	Institutional Capacity model	One-dimensional	Provides for the mechanisms for cooperative governance of DRM between National/regional/international role-players	9-11
2.	Disaster Risk Management Policy Making cycle model	One-dimensional	Provides for the submission of policy recommendations for DRM	15
3.	Disaster Risk Assessment model	One-dimensional	Provides for the risk assessment process	60-61
4.	National, Provincial and Municipal Disaster Management	Multidimensional	Provides for the coordination of the plans and frameworks across all spheres of government.	82-83

	Framework/plan model			
5.	Disaster response and Recovery model	Multidimensional	Provides for planning for disaster response and recovery, as well as rehabilitation and reconstruction	114-115
6.	Process model for the classification and declaration of a state of disaster	Multidimensional	Provides for the classification and declaration of disasters	119-121
7.	Model for an Integrated information management and communication system for Disaster Risk Management	Multidimensional	Provides for information and communication management	135-136

(Source: Adapted from NDMF, 2005)

As can be seen in Table 4.9, the models in column emphasise:

Firstly, the institutional capacity model that can be seen as a one-dimensional model which highlights the importance of cooperation between the various national, regional and international DRM role-players.

Secondly, the DRM policy-making cycle model concentrates on policy recommendation concerning DRM. It is also classified as a one-dimensional model.

Thirdly, the Disaster Risk Assessment model, which is also a one-dimensional model, focuses on the Risk Assessment process.

Fourthly, the National, Provincial and Municipal Disaster Management Framework/Plan model focuses on coordination of DRMP and DRMF between the spheres of government.

Fifthly, the Disaster Response and Recovery model, which can be seen as a multidimensional model, emphasises the effective planning of disaster response and recovery. It also focuses on rehabilitation and reconstruction after a disaster.

Sixthly, the Process model focuses process on the classification and declaration of a state of disaster.

Lastly, another multidimensional model focuses on management and communication systems for Disaster Risk Management.

Although all four models discussed are referred to as multidimensional, one may argue that, they are two-dimensional, since they emphasise only two dimensions. This is important to note, because the proposed integrated Disaster Risk Management model for this study is three-dimensional, since it emphasises the dimensions of Operations Management, Hazard Analysis and Risk Management.

4.13 MAIN ELEMENTS OF DISASTER RISK MANAGEMENT MODELS

For the purpose of this study, a comparison was made amongst the seven different models taken from the NDMF (2005). The most important components of Disaster Risk Management, which is highlighted in Table 4.9 of this study, are the four Key Performance Areas, the three Enablers, the management of disaster (Operations Management), community involvement, and monitoring and evaluation. These important components were under investigation to establish which elements are common amongst the different models.

Table 4.10 below illustrates the details of how the most important components of the proposed model was established.

Table 4.10: Models that contain the main elements of DRM

The main elements	**Model No from Table 4.9 that includes these elements**
The Key Performance areas	**Reference**
KPA 1 – Integrated institutional capacity	1,4,7
KPA 2 Disaster risk Assessment/Hazard Analysis	2,3,5,6,7
KPA 3 Prevention or risk reduction of disasters	2,3,4,7
KPA 4 Disaster risk response and Disaster recovery	2,4,5,6,7
The Enablers	
Enabler 1: Information management and communication	2,6,7
Enabler 2: Education training, public awareness and research	2
Enabler 3: Funding arrangements for Disaster Risk	

Management	
Other elements	
Operations Management – Planning operations	1,2,3,4,7
Community Involvement	1,2,5,7
Monitoring and Evaluation	2,5,7
Environment	

(Source: Researcher's own interpretation)

The first column in Table 4.10 indicates the four Key Performance Areas, the three enablers and other elements. The second column indicates the model number/s that incorporate/s the various elements. For example, in developing Models 1, 4 and 7, to carry out Key Performance Area 1, it was found, that Integrated institutional capacity was an important element. Likewise, in developing Models 2, 3, 5, 6, and 7 to carry out Key Performance Area 2, it was found, that Disaster Risk Assessment and Hazard Analysis were important elements.

However, it was found, that no single model in the NDMF (2005) included all the elements of Disaster Risk Management. However, the Disaster Risk Management Policy Making Cycle model (model 2) contains eight of the main elements of Disaster Risk Management. The model for an integrated information management and communication system for Disaster Risk Management (DRM model 7) contains seven of the main elements of Disaster Risk Management. What is also important to note is although funding arrangements and the environment, are integral elements of DRM, these are not included in any of the models discussed.

Therefore, from the above comparative analysis, one may argue that most of the DRM models (Table 4.9 and 4.10) are operating by narrowly defined aspects/elements of DRM. In addition, these narrowly defined aspects/elements of DRM are either one or two dimensional. For these reasons, one may argue that the models discussed are neither integrated nor comprehensive Disaster Risk Management models.

Notwithstanding, the above discussion, the seven DRM models presented in the NDMF (2005:9-136) are designed to assist public official who are responsible for DRM in the three spheres of government, to get a better understanding of the four different components of DRM. These four key performance areas are integrated institutional capacity, Disaster Risk Assessment/Hazard Analysis, Prevention and Risk Reduction

of disasters, and Disaster Risk Response and Disaster Recovery. In addition, the three enablers that also form part of the main aspects/elements of DRM are: Information Management and Communication, Education and Training, Public Awareness and Research, and Funding arrangements for Disaster Risk.

Thus, to develop an Integrated Disaster Risk Management model for municipalities in the Free State Province, the main elements as depicted in Table 4.10 must be included to promote effective Disaster Risk Management services. All of these components have been rearranged to form three core elements, which are discussed in the next section of this study.

The next discussion emphasises Operations Management, Hazard Analysis and Risk Management as core elements of Disaster Risk Management. These core elements are included in many national and international Disaster Risk Management models as discussed in Chapter 4, under Category of Models of this study.

4.13.1 Operations Management

According to Van Niekerk (2005:17), operations management relates to all the activities taken to achieve operational goals. These include the planning, organising monitoring and evaluation of activities to achieve operational goals successfully. The specific tasks for effective disaster risk operations management are preparedness, prevention, mitigation, response and recovery are discussed below.

4.13.1.1 Disaster Preparedness

This refers to all the planning activities undertaken to respond appropriately to manage the negative impacts of a disaster. The Sendai Framework (2015:56) discusses preparedness as the knowledge and capacities that have been developed to anticipate, respond to and recover from the hazards. It is a multisectoral activity, which ensures the development of Disaster Risk Management plans and programmes to prevent, mitigate, respond to and recover from a disaster (Sendai Framework 2015:56). Thus, preparedness includes evaluating the risk, adopting standards and regulations for quality assurance in infrastructure development.

4.13.1.2 Prevention

Prevention refers to all activities taken to avoid or minimise the negative impacts of natural, technological and biological disasters (NDMF, 2005:233). Van Niekerk (in Van der Waldt *et al.,* 2007:41) describes prevention as the measures taken to minimise the effects or the disaster itself. Tau *et al.* (2006:19) describe prevention as the measures taken to permanently protect or reduce the negative effects of an event so that it does not become a disaster. Thus, in the operations management context, prevention refers to some specific activities such as mitigation, preparedness, response and recovery.

4.13.1.3 Mitigation

Mitigation refers to the permanent elimination or the reduction of disaster risks by removing or limiting the threats of physical, social and/or economic threats. Since natural hazards are certain and unavoidable, it is important for governments all over the world to plan and prepare for threats that may affect its communities. Thus, there have been many international initiatives such as the millennium development goals, the Hyogo Framework for Action, Sustainable Development Goals, International Climate Change Negotiations and the recent Sendai Report. These initiatives are intended to provide broad guidelines to countries to develop mitigation measures such as the provision of housing away from flood-prone areas, public education and awareness campaigns and early warning systems.

4.13.1.4 Response

According to the Sendai Framework (2015:56), in the DRM context refers to the development of plans and programmes to intervene when a disaster occurs. Response is the instant set of actions taken immediately when a disaster occurs to assess the needs, to reduce the suffering, to limit the spread and to commence rehabilitation as soon as possible. This is in anticipation of restoring the normal functioning of the affected community. Hence, examples of response activities may include an effective public warning system, emergency operations procedure, search and rescue plans, securing food, water and medical services and maintaining law and order.

Operations management in Disaster Risk Management involves the management of various activities discussed above. Furthermore, human, financial, information and equipment resources must be catered for if these activities are to be effectively managed. Therefore, all work undertaken to manage disaster risks will be performed as managing projects. The above aspects should be taken into account with the development of the proposed integrated Disaster Risk Management model for municipalities of Free State province.

4.13.2 Hazard Analysis

The different types of hazards that generally occur in South Africa are illustrated in Table 4.11 below.

Table 4.11: General hazard types present in South Africa

Type	Hazards	
Geological hazards	• Earthquake • Tsunami • Volcanic eruption	• Landslide • Dam burst • Mine Fire
Water and climatic hazards	• Tropical Cyclone • Tornado and Hurricane • Floods • Drought • Hailstorm	• Cloudburst • Landslide • Heat and Cold wave • Snow Avalanche • Sea erosion
Environmental hazards Biological	• Environmental pollutions • Deforestation • Human / animal • Epidemics • Pest attacks	• Desertification • Pes Infection • Food poisoning • Weapons of Mass • Destruction
Chemical, industrial and nuclear accidents	• Chemical disasters • Industrial disasters	• Oil spills / fires • Nuclear
Accident related	• Boat / road / train • Accidents / air crash • Rural / Urban fires • Bomb / serial bomb • Disasters blasts • Forest fires	• Building collapse • Electric accidents • Festival related • Mine flooding

(Source: Adapted from Pasipamire, 2011:3)

There are many types of hazards that may be defined as either a natural or man-made event that may cause harm or injury to people and infrastructure. As depicted in Table 4.11 above, there are five hazards types, geological hazards, water and climatic hazards, environmental and biological hazards, chemical, industrial and nuclear accidents and accident-related hazards. In addition, for each hazard type, a number of examples are cited. What is of importance is that the hazard type and the related examples are only suggested and may be reclassified and many more examples many be identified in each category. Furthermore, hazard analysis is a three-step process that involves hazard identification, vulnerability analysis and risk analysis as indicated in Table 4.12 below.

Table 4.12 The US Environmental Protection Agency Hazard Analysis Process

Hazard analysis process		
Hazard identification	**Vulnerability analysis**	**Risk analysis**
Identify hazards	Identify vulnerability zone	Estimate the likelihood of the hazard taking place
Identify the location of the Hazard	Identify the population (human)	Identify the severity of the Hazard
Identify nature of the Hazard	Identify critical facilities	Identify the consequences of the hazard taking place
Identify size of the hazard	Identify the hazard environment	

(Source: Pine, 2015:11)

4.13.2.1 Hazards identification

A hazard analysis may be conducted so that mitigation measures may be effected for communities to be better prepared for disasters rather than for communities to respond and recover from a disaster after it has occurred. In addition, hazard analysis involves the identifying of specific hazards a community be faced with. In this regard, communities must form part of the vulnerability analysis teams. This may include schools, business, medical treatment organisations, media, public safety organisations etc. It is also important to note that individual and organisational activities may influence social, environmental and economic capital (Pine, 2015:10-13). The hazards may be classified into three categories: Community Assets, Economic Assets and Natural Resources as depicted in Table 4.12 after identifying

the hazard, the location of the hazard must be determined then the nature and size of the hazard must be established (Pine, 2015:10-13).

4.13.2.2 Vulnerability analysis

Vulnerability refers to the degree of exposure to the hazard. It must be a future projected activity involving human population, critical facilities and the environment. This means the frequency, duration, the speed, the geographical location, and the magnitude of the event must be established. According to Pine (2015:10), a broad based community involvement is encouraged and led by local response teams for the vulnerability assessment process. The communities may be best placed to identify vulnerable zones and communities such as, people in hospitals, schools, prisons, day care centre and the environment as indicated in Table 4.12.

4.13.2.3 Risk analysis

Risk Analysis refers to the understanding of the consequences of the impact of the hazard on vulnerabilities. This involves the analysis of the (probability) likelihood of the incident happening and the severity of the consequences of the incident as indicated by Table 4.12. In addition, risk analysis is the estimation of the injury to people, damage to critical facilities such as hospitals and schools, bridges and roads. Moreover, the projection may also include damage to the environment, the economy and property (NDMF, 2005:59-62).

4.13.3 Risk Management

Risk is the likelihood or the probability of the hazard occurring in a given period of time and the consequences thereof (NDMF 2005:59-62). In addition, risk management is a decision-making concept where risk identification and risk analysis are concerned. The outcomes of this analysis will determine whether the risk is of acceptable level and if not what may be done to reduce the levels. According to the DMA (2002), there are four steps in the risk management process: Firstly, identify the specific disaster risk to be assessed. The next step is to analyse the specific risks. This is followed by an evaluation of the risk. Finally, it involves the implementation of risk reduction plan and

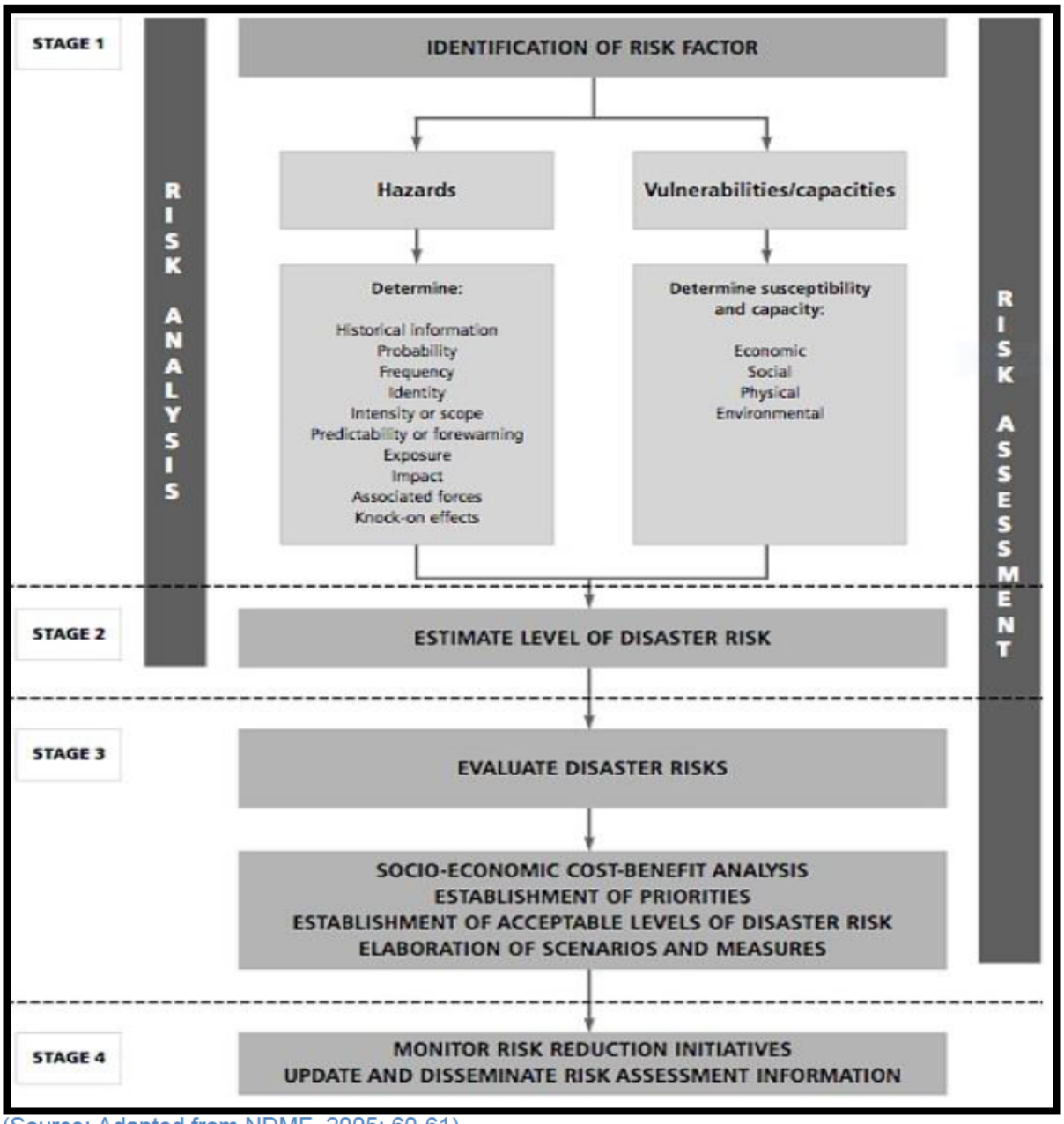
monitoring its effectiveness. This process is discussed in detail in the next section as indicated in Figure 4.5 below.

4.13.3.1 Identify disaster risk

By identifying the specific disaster risk, it will assist public officials responsible for DRM in the three spheres of management, including municipalities, to determine what or who is vulnerable. Thereafter, DRM officials need to determine the available capacity to deal with the disaster. In this regard, Disaster Risk Management officials are required to identify and describe the hazard with specific reference to its magnitude, frequency, speed of onset, the areas affected and its duration. Historical information such as what and who were exposed to the disasters and to what extent were the communities affected will assist in the planning and preparing for an impending disaster (Tau, 2006:19).

The vulnerability of people (social capital), critical infrastructure (economic capital) and environment (environmental capital) must be considered. This may help to calculate the likely costs, identify the capacity, gaps, inconsistencies, and efficiencies that are available to reduce the losses (NDMF, 2005:59-62). All of the above need to be taken into account with the development of a DRM integrated model.

Figure 4.5: The Risk Assessment process



(Source: Adapted from NDMF, 2005: 60-61)

4.13.3.2: Analyse the disaster risk

When analysing the disaster risk, the threat levels posed by the hazard must be estimated. To determine whether the risk is a priority or not, establish the likelihood of a hazard and its expected impact (NDMF, 2005:62).

In this regard, Pine (2015:132) suggests the following factors in the ranking process:

- The likelihood and consequences of the hazard.

- The voluntary or involuntary nature of the risk
- Is there a benefit to cost ratios of mitigating different risks?
- Are there political and social ramifications of certain mitigation decisions?

Moreover, a consequence, frequency and cost analysis of the risks may be conducted. Once this analysis process has been concluded, it may become easier to evaluate the risks, to decide on an action plan for the treatment (mitigate) of the risk (Pine, 2015:132).

4.13.3.3 Risk evaluation

According to Reddy (2010:129), this stage involves the further prioritisation of disaster risks, if there are many competing threats assessed at the same level. Moreover, further prioritisation is a necessary process in a country such as South Africa, since there is a lack of financial and other resources, to render effective Disaster Risk Management services. To prove this point, Table 4.13 below reflects the types of risk, the risk assessment methods to be employed and the expertise required for effective risk assessment (Reddy, 2010:129).

Clearly, Table 4.13 demonstrates some of the expertise required such as flood, medical, fire, extreme weather and drought for risk assessment. In addition to the scientific expertise, indigenous knowledge may be obtained from the community must be used to assess the threats. Hence, risk evaluation is a highly specialised, multidisciplinary, integrated and a comprehensive process, which cannot address all the threats at the same time. In this regard, the next step is the beginning of the treatment of risks (Reddy, 2010:129).

Table 4.13. Types of disaster risk, assessment method and expertise required

Types of risk	**Possible Disaster Risk Assessment methods**	**Expertise required**
Potential flood risk in a developed estuarine area	Flood hydrology and hydraulics Ecological and environmental assessment	Environmental and hydrological specialists
Potential cholera risk in an	Epidemiological risk assessment Environmental health assessment Groundwater evaluation	Public and environmental health specialists

isolated area known to be cholera-prone		
Potential fire risk in a large informal settlement	Historic and seasonality review of past fire events graphed or mapped over time Aerial photographs to indicate density or other spatial changes over time Participatory rural appraisal (PRA)/livelihoods analysis/ focus-group interviews Demographic and socio-economic analysis	Urban development facilitators/ planners Fire prevention specialists Social scientists
Potential wind storm or tornado risk in a rural area	Consultation with local leadership History of past events Historic climatology and seasonal analysis	Indigenous knowledge Community facilitators Climate scientists
Drought risk in a rural community	PRA/ livelihoods analysis/ focus group interviews Historic climatology and seasonal analysis	Rural development facilitators Agricultural specialists Public Health specialists Climate scientists

(Source: Adapted from NDMF 2005; Reddy, 2010)

4.13.3.4 Treat the risk

This stage involves the monitoring and evaluation of Disaster Risk Reduction programmes to ensure whether the planned programmes are effective. What is more is that information collected up to this stage may be disseminated to the relevant stakeholders, which in turn may assist in the development of plans and programmes (NDMF, 2005:63).

Thus, there may be need for municipalities to modify existing programmes and plans according to changed circumstances and new developments. In this regard, the outcomes of stages 1 and 2 should inform the development of a Level 1 DRM Plan, the outcomes of stages 3 and 4 should inform the development of Level 2 and Level 3 DRM plans (NDMF, 2005:63). Not all municipalities are faced with the same threats. Urban populations for example, may be faced with urban flooding due to inappropriate and inadequate storm water drainage systems compared to rural municipalities, which

may be confronted by riverine flooding. For this reason, municipalities may employ different methods to conduct their disaster risk assessments.

In addition, the social, physical and human vulnerabilities may vary from province to province and from municipality to municipality. Notwithstanding these differences, all capable municipalities are required by law to develop a plan, which serves as a blue print for Disaster Risk Management within its jurisdiction. Similarly, not all municipalities are functioning at the same level. Thus according to the available resources, experience and expertise at metropolitan, district and at local level, the DRM plans may be either at Level 1, 2 or level 3. In this respect, any municipality that has developed a level three plan ought to be functioning at the highest level of planning.

In as much as the plans of the different municipalities differ according to the threats they are confronted by and resources available to minimise the impact of the disaster, all municipalities must adhere to the legislative requirements and meet the basic principles for effective Disaster Risk Management. For this reason, a comparative analysis of three metropolitan municipalities was undertaken. These were the CoCT Metropolitan Municipality (CoCT) in the Western Cape, the Ekurhuleni Metropolitan Municipality, in the Gauteng Province and the Mangaung Metropolitan Municipality in the Free State Province.

4.14 CONCLUSION

In this chapter, an in-depth study of Disaster Risk in three of the South African Metropolitan Municipalities, namely the City of Cape Town Metropolitan Municipality, the Ekurhuleni Metropolitan Municipality and the Mangaung Metropolitan Municipality was conducted. The profile of each of the provinces of these municipalities was discussed and the reasons for studying these metropolitan municipalities were elaborated upon. The City of Cape was chosen because of its coastal topography and that it is prone to fire and flood disasters. The Ekurhuleni Metropolitan Municipality was selected because of its aerotropolis status and that its infrastructure is so complex that it may be comparable to some smaller countries in Africa. The Disaster Risk Management functions of the two metropolitan municipalities were compared to that of The Mangaung Metropolitan Municipality in the Free State Province.

In addition, the functioning of Disaster Risk Management in the Free State Province, the Provincial Disaster Management Centre, in the 4 districts and the 19 local municipalities were analysed. For this reason, the Disaster Management Annual Report of 2016 of the Free State PDMC and the Integrated Development Planning 2016 of the Mangaung Metropolitan Municipality were used to support the findings of this study.

Thereafter after an intensive analysis of literature on national and international Disaster Risk Management models and frameworks were discussed. The challenges, characteristics, benefits, dimensions, structure and their functioning were discussed.

It was found, that the complicated nature of Disaster Risk Management, presents a misunderstanding of the basic terms and concepts of disaster risk management. As a result, the roles and responsibilities of Disaster Risk Management officials have become unclear. Another concern is that in all district municipalities where disaster risk management plans have been drawn up, as many as 20 hazards are indicated. In addition, scientific disaster risk assessment was conducted only in the Mangaung Metropolitan Municipality and the Free State Province, the 4 district municipalities as well as the 19 local municipalities are excluded from this important disaster-risk reduction function because of a lack of Disaster Risk Management capacity.

For this reason, the proposed integrated Disaster Risk Management model will make the understanding of the basic tenets of Disaster Risk Management simpler. It will also bring about a common understanding of the three main elements, namely Operations Management, Hazard Analysis and Risk Management, for a unified approach to Disaster Risk Management in the Free State Province. In addition to very little information available on Disaster Risk Management, there are very little implementable tools to support Disaster Risk Management officials. Therefore, this study proposes an integrated Disaster Risk Management model, which will support Disaster Risk Management officials in the various municipalities and government departments to understand Disaster Risk Management better.

CHAPTER FIVE: DATA COLLECTION AND DATA ANALYSIS

5.1 INTRODUCTION

The preceding chapters outlined the literature review regarding disaster risk management. The literature review was conducted by appraising statutory legislative policy guidelines and frameworks, government reports and documents concerning Disaster Risk Management in Chapter 2. In Chapter 3, the discussion focused on Disaster Risk Management in three of the eight metropolitan municipalities in South Africa and then a detailed analysis of the DRM services in all Free State municipalities followed.

The international and local models, principles and requirements for Disaster Risk Management, disaster response, recovery, mitigation, risk reduction, prevention and disaster risk preparedness were discussed in Chapter 4.

In addition, the review of the available literature on Disaster Risk Management formed the theoretical foundations for the relationship that existed amongst the variables. In this regard, the available information was used to develop a structured questionnaire and a semi-structured interview schedule, which were used for the empirical study. Hence, the discussion begins with the methodology and practices employed in data collection and to ensure that the objectives are achieved.

This chapter scrutinises the research methodology, research design, research philosophy, and the research strategy to collect data. The chapter further explains the research process that was followed to achieve the research objectives. This is followed by a discussion about the research population and sampling methods, the research instrument, data collection, data analysis and triangulation. A comparative analysis of the quantitative and qualitative approaches was conducted to demonstrate the usefulness of both approaches in a single study.

5.2 RESEARCH METHODOLOGY AND APPROACHES

5.2.1 Research methodology

According to Welman *et al.* (2005:2), the research methodology considers and explains the logic behind using particular research methods and techniques. Leedy and Ormond (2005:12) maintain that the research methodology is the general approach that the researcher uses to carry out the research project. The research methodology dictates how specific tools such as the library, computer and software, measurement techniques, statistics, questionnaires, interviews and language that the researcher selects for the research will be applied (Leedy and Ormond 2005:12). In this study, a mixed approach consisting of both qualitative and quantitative approaches was used to elicit information from the respondents. A structured questionnaire was used to collect numerical data, whilst the interview schedule used semi-structured questions to illicit descriptive data. The structured questionnaire as well as the semi-structured interviews solicited data regarding the functioning of disaster risk management in the Free State Province (Welman *et al.,* 2005:2, Leedy and Ormond, 2005:12).

5.2.2 The three research approaches

According to Du-Plooy-Cilliers *et al.* (2014:14), the main consideration that a researcher needs to consider is whether a qualitative or quantitative approach or even both, known as mixed research will be used. There are three approaches that researchers may use in pursuit of their studies, namely quantitative, qualitative and the mixed approach (Du-Plooy-Cilliers *et al.,* 2014:14). The quantitative approach is an ordered process, which is used to collect numerical data and is distant from the respondents (Bless *et al.,* 2014:16). The qualitative approach, on the other hand, involves a much more focused and detailed data-gathering process (Mouton, 2005:161). Furthermore, the qualitative approach describes the behaviour of human beings and it recognises that meaning may be derived from interacting with people (Mouton, 2005:161). According to Tichapondwa (2013:108-109), a qualitative approach is descriptive and narrative by nature. From the discussion above, one may argue that using both approaches in a single study are referred to as using a “mixed approach”

(Du-Plooy-Cilliers, *et al.,* 2014:14; Bless, *et al.,* 2014:16; Mouton, 2005:161; Tichapondwa, 2013:108-109).

5.2.2.1 The qualitative approach (phenomenological research)

According to Du Plooy-Cilliers *et al.* (2014:173), qualitative research focuses on the underlying qualities of subjective experiences and the various meanings associated with a particular phenomenon. Qualitative research reflects certain approaches to knowledge production and includes any research that makes use of qualitative data (Mouton, 2005:161; Welman *et al.,* 2005:6-7). The goal of qualitative research is to investigate and understand a central phenomenon; therefore, qualitative researchers collect words and images about a central phenomenon. By using this approach, the researcher often approaches reality from a constructivist position that accepts multiple meaning of individual experiences

The qualitative approach is inductive and subjective by nature, meaning that the researcher engages in the research and makes sense of the multiple nature of realities by interpreting what is happening in the environment. The qualitative approach describes the respondent's perception of a specific phenomenon using thick text, words and pictures. Semi-structured interviews were adopted as a method to collect data with this approach (Mouton, 2005:161; Welman *et al.,* 2005:6-7).

Du Plooy-Cilliers *et al.* (2014:173) aver that the qualitative approach deals with the underlying qualities of subjective experiences, including the different meanings that are associated with an issue or with a phenomenon. Neuman (in Du Plooy-Cilliers *et al.,* 2014:173) is of the opinion that the qualitative approach allows a researcher to provide a detailed description of subjective experiences and meanings that are based on qualitative data. In Tichapondwa (2013:108), Denzin and Lincoln (1994:2) state that a qualitative research paradigm involves an interpretative and naturalistic approach to what is being researched. Furthermore, Marshall and Bosman (2006:2), define qualitative research as a broad approach to the study of a subject matter, which is a social phenomenon. However, the qualitative approach in research may be summed up as an in-depth study of a social phenomenon in its natural context from various perspectives (Du Plooy-Cilliers *et al.,* 2014:173; Tichapondwa, 2013:108).

5.2.2.2 The quantitative approach (positivist paradigm):

Bless *et al.* (2014:16) state that by using a quantitative approach, the researcher follows a natural science approach when collecting data, which includes measurement steps in order to remain as objective or neutral as possible. According to Bless *et al.* (2014:16), the qualitative research approach allows the researcher to be more flexible. Furthermore, Bless *et al.* (2014:16) point out that the focus of such a study is to determine what respondents think about a specific phenomenon or issue.

According to Bless *et al.* (2014:58), quantitative research depends upon measurements and the use of various scales. Du Plooy-Cilliers *et al.* (2014:14), on the other hand, explains that qualitative research presents numerical or statistical data. Welman *et al.* (2005:6) are of the opinion that the data of quantitative research consist of numbers and emphasise the measurement and analysis of causal relationships between variables. Maree *et al.* (2016:307) agree that the quantitative research approach relies on numerical data to test the relationships between the variables (Welman *et al.,* 2005:6; Maree *et al.,* 2016:307).

The quantitative research process, on the other hand, is deductive and objective, where the researcher remains distant from the phenomenon to be researched and where the relationship between variables is compared. Since the quantitative approach (positivism) is used for numerical data collection, a structured questionnaire was found to be the ideal instrument to collect data from the respondents (Welman *et al*., 2005:6).

5.2.2.3 The mixed approach (pragmatism paradigm):

According to Tichapondwa (2013:110), the use of both quantitative and qualitative approaches in a single study is referred to as the “mixed approach” Tichapondwa (2013:110) further avers that many researchers refer to using a combination of these approaches as the mixed approach, the multiapproach, pragmatism or triangulation.

In the social sciences, the use of at least one quantitative and one qualitative approach in a single study has become popular in recent times. The reason for this popularity is

that the mixed approach (qualitative and quantitative) addresses the research question differently.

According to Tichapondwa (2013:110), the mixed approach consists of quantitative and qualitative methods in a single study; yet they complement each other and offer a holistic understanding of the phenomenon under review. Tichapondwa (2013:110) further states that when using both the approaches in a single study, it is referred to as the "mixed approach, also known as the multiapproach, pragmatism or triangulation (Tichapondwa, 2013:110).

Maree *et al.* (2016:312) contend that the mixed-method research approach is a relatively new approach, which builds on both quantitative and qualitative approaches. Du Plooy-Cilliers *et al.* (2014:33) agree that a mixed approach, also known as mixed-method research, entails a combination of quantitative and qualitative research. Bless *et al.* (2014:160 state that by using a mixed approach, the researcher might combine a structured questionnaire (quantitative research) and open-ended or semi-structured interviews (qualitative research) such as in this study. Other combinations include a combination of surveys (quantitative research) and using a case study (qualitative research), or the researcher may use a combination of a questionnaire (quantitative research) and observations (qualitative research) (Maree *et al.,* 2018:312).

The mixed approach (pragmatism), just like the other two approaches, also has its strengths and weakness, which will be outlined below.

Some of the strengths of the mixed approach include the production of a more complete knowledge that could be used to inform policy (Tichapondwa, 2013:110). Furthermore, information produced by using the mixed approach may strengthen the argument and widen the evidence base. Thus, the statistical information gathered in quantitative research may add precision to the narrative arguments of the qualitative aspect (Olsen, 2004:10-14).

On the other hand, the challenges posed by using both the quantitative and qualitative approaches can be time consuming and expensive. Since the mixed method is a flexible approach that accommodates the different viewpoints of the phenomenon, being studied, it was the preferred approach for this study. In this study, the mixed-

method approach or pragmatism was used to collect a blend of narrative and numerical data. Therefore, in this study, the mixed method allowed to find what was sought, rather than suggest a fixed epistemological stance (Olsen, 2004:10-14 and Tichapondwa, 2013:110).

According to Kgakatsi and Rautenbach (2014:104), the mixed approach refers to a multimethod approach, which allows for an in-depth understanding of the phenomena under review. Kgakatsi and Rautenbach (2014:104) further state that the multimethod allows for factors such as language and religion to be infused into a study, which clearly differs from the quantitative approach that focuses on numerical data. Furthermore, the multimethod approach is a data-gathering technique, which may also serve as an effective analytical tool (Kgakatsi and Rautenbach, 2014:104).

The discussion above clearly demonstrates the reasons for using the mixed approach to answer the research question of a complex phenomenon, such as Disaster Risk Management in this study. The mixed-method approach was found to be ideal to accommodate the differences and limitations and to provide for a much deeper and authentic research finding.

For the quantitative approach, a structured questionnaire was used as an instrument to collect numerical data, while in the qualitative approach, the literature reviews and the semi-structured interviews were the preferred methods to collect narrative data. Therefore, the mixed method was found to be ideal to accommodate the differences and limitations and to provide for a much deeper and authentic research finding (Kgakatsi and Rautenbach, 2014:104; Williams, 2007:73-75).

In the light of the above, the quantitative research approach is mainly used in the formulation of opinions, while the qualitative approach is likened to describing phenomenon as it is experienced by respondents. For these reasons, both approaches were found to be necessary for this study.

Table 5.1 below presents some of the characteristics, benefits and limitations of both the qualitative and quantitative approaches.

Table 5.1 Characteristics, benefits and limitations of qualitative and quantitative approaches

Criteria	Qualitative approaches	Quantitative approaches
Characteristics	Describes phenomenon very deeply.	Recognises general patterns
	Uses open-ended questions	Used closed-ended questions
	Highly structured or less-structured informal interviews.	Surveys are distributed – respondents do not meet the research
	Focus group/small number of Respondents	Large group of Respondents
Benefits	New phenomenon is recognised with this approach	Outcomes are Generalised.
	Provides deeper understanding of processes	Informs policy guidelines
	Provides for verbal information to be converted into numerical data	More objective
	May reveal information that may not be shown by surveys.	
Limitations	Results cannot be generalised	Difficulty in recognising new phenomena
	Challenges in applying statistical methods	
	Challenges in assessing relations between characteristics	Difficulties interpreting without control group

(Source: Adar Ben-Eliyahu, 2014:1-2).

As indicated in Table 5.1 above, there is a clear distinction between the two research approaches, each having its own strengths, challenges and limitations. For instance, the qualitative approach allows for small group of respondents, whilst the quantitative approach allows for larger groups of respondents. Furthermore, the qualitative paradigm provides for deeper understanding of aspects such as human behaviour and feelings, whilst the quantitative methodology informs policy development and generalisation.

In addition to the variety of differences and limitations between the approaches, there is also a significant variance in their principles. The differences in the principles of qualitative and quantitative approaches are outlined in Table 5.2 below. In this study, the qualitative approach was represented by an extensive literature review and semi-structured interviews, whilst the structured questionnaire represented the quantitative approach.

The different principles of qualitative and quantitative research approaches are outlined in Table 5.2 below.

Table 5.2 Differences in the principles of qualitative and quantitative approaches

Principles	Qualitative research approach	Quantitative research approach
Purpose	Understand and interpret social interactions	To look at cause and effect and make predictions
Group Studied	Focus group/not randomly selected	Larger group randomly selected
Variable	Study of the whole and not variables	Specific variables studied
Type of Data collected	Word, images, objects	Numbers and statistics
Form of Data	Qualitative – interviews, observations	Quantitative – precise measurements
Type of Data Analysis	Identify patterns/themes	Identify statistical relationships
Role of Researcher	Researcher and bias known	Researcher and bias unknown
Results	Particular or specialised findings	Generalised findings
Scientific Method	Exploratory – generates new hypothesis	Confirmatory researcher tests hypothesis
Human Behaviour	Dynamic, situational, social and personal	Regular and Predictable
Common Research Objective	Explore, discover, construct	Describe, explain and predict
Focus	Wide-angled Lens – Examines breadth and depth of phenomena	Narrow-angled lens – Tests specific hypothesis
Nature of Observation	Study behaviour in the natural environment	Study behaviour in controlled environment
Nature of Reality	Multiple realities	Single reality
Final Report	Narrative report with contextual description	Statistical report with correlations

(Source: Johnson, 2008:7-8; Lichman, 2006:7-8)

As indicated in Table 5.2 above, Johnson and Christensen (2008:34) are of the opinion that the principles are distinctly different in the two approaches. Whilst in the qualitative methodology the phenomena are examined from a wider or more in-depth perspective, in the quantitative approach, the phenomena are viewed from a narrative and numerical point of view.

For this reason, one could argue that when examining a multisectoral, multidimensional phenomenon such as Disaster Risk Management, it is important to use the quantitative as well as the qualitative approaches. Since the mixed approach

would add depth and breadth and produce quality findings, it was the preferred approach for this research.

5.3 RESEARCH PHILOSOPHY/PARADIGM

The research paradigm is a worldview or the overall understanding of the research methodology (Welman *et al.,* 2005:3). The general approach to do research refers to the research paradigm that will be followed or the way in which research should be conducted. The research paradigm encompasses the progress of the particular scientific practice that is based on a person's philosophies and assumptions about the world or a phenomenon (Welman *et al.,* 2005:3). Maree (2018:52) is of the opinion that a paradigm refers to a set of assumptions or ideas about a fundamental aspects of reality that leads to the development of a particular worldview. There are many research paradigms available; however, the three types of paradigms that are mostly used by researchers are the positivism, post-positivism or interpretivism and the pragmatism paradigm. The positivism paradigm makes use of quantitative research; the interpretivism paradigm represents the qualitative approach; and the pragmatic paradigm represents a mixture of both qualitative and quantitative paradigms. (McGregor and Mumane, 2010:422).

Positivism is associated with natural science in that this paradigm accepts knowledge to be true if it is created through scientific methods. The positivism paradigm is also known as the quantitative approach. Willis (2007:27) states that post-positivism also known as the interpretivism or interpretive paradigm that assists the researcher in understanding how the people under investigation think, interact and behave in a particular situation.

For the purpose of the study is it important to note that there are no agreed or precise terms because some scholars suggest that the interpretivist paradigm is an anti-positivist or post-positivism paradigm, while others describe interpretivism as constructivism (Maree *et al.,* 2016:60).

Furthermore, interpretivism advocates the need to consider subjective interpretations of people and their perceptions of the world as a starting point to understand social phenomena. In addition to the above, the pragmatic paradigm entails the use of a mix

of different research methods as well as modes of analysis to find solutions to specific problems, by using a combination of both qualitative and quantitative research methods as in the case of this study. According to Du Plooy-Cilliers (2014:31), another paradigm that was developed out of frustration with positivism and with interpretivist's passive, subjective and relativist view, is critical realism that has its origins in Germany. Critical realists use a mixed-method approach by combining methods associated with both qualitative and quantitative research. Followers of the critical realism paradigm are of the opinion that by using multiple sources of data collection, the validity and reliability of data increase (Du Plooy-Cilliers, 2014:31).

In addition, the researcher had to learn and understand how to apply the mixed-method paradigm in a single study. The qualitative study was influenced by an interpretivist paradigm, where data were collected from literature reviews as well as face-to-face interviews. For the post-positivist paradigm, which is also known as realism, data were collected from the literature review and the survey.

For this reason, the descriptive, interpretivist paradigm was applied by answering the research questions of this study. The interpretivist paradigm (Willis, 2007:27; Maree and Van der Westhuizen, 2007:37) assisted the researcher to better understand, how the people under investigation think, interact and behave, in their natural environment. Likewise, interpretivism allowed the researcher to use his judgement and perspective when interpreting data. Therefore, this paradigm assumed that there was more than one reality (Willis 2007:27; Maree and Van der Westhuizen, 2007:37).

In this study, the pragmatic paradigm that focuses on mixed research methods as well as modes of analysis were used. The study was mainly informed by the positivist paradigm and then supported by the post-positivistic paradigm or interpretivism paradigm. The post-positivistic paradigm validated any gaps generated by the positivistic analysis in order to verify the depth of the identified factors. In this regard, these paradigms, like all others, are made up of philosophical elements such as epistemology, ontology and axiology; all of which influenced the research project in some way or the other and are discussed below.

5.3.1 Epistemology

Epistemology is derived from *episteme*, which is the Greek word for 'truthful knowledge". In this regard, Mouton (2005:113) argues that it is not possible to produce scientific results that are true for all times and within all contexts (Mouton, 2005:113). Therefore, scholars must strive for the most truthful and valid results while conducting research. Creswell (2013:20) argues that the most truthful knowledge resides closest to the respondents and therefore the qualitative approach adopted by this study allowed for obtaining the most truthful knowledge. In view of the latter, this study was based on the interpretivist and post-positivist epistemologies. This is where a description of the behaviour of human beings, in this case officials involved in Disaster Risk Management, was recorded (Creswell, 2013:20; Mouton, 2005).

Moreover, the researcher was immersed in the study to understand cultural issues regarding DRM, the functioning of institutions, individuals and management staff in DRM operations in municipalities. For this reason, the interview method was employed to collect data (Mouton, 2005:113).

Further to the interpretivist paradigm, the pragmatic post-positivist approach was also used. In this context, positivism is a research philosophy that is quantitative by nature. Numerical data form the cornerstone of this paradigm and the basis of numerical data collection was the survey method. The questionnaire was distributed electronically to the respondents. Disaster Risk Management officials at functional level, who formed the sample, were requested to complete the questionnaire and return them electronically.

Some aspects of the post-positivist as well as the interpretivist empiricist epistemologies were used in this research, as well as critical realism, which entailed quantitative and the qualitative approaches. The pragmatic approach is also termed the mixed approach, the multimethodology or pragmatism, which in this study offered a much deeper understanding of Disaster Risk Management. In this way, DRM concepts, experiences, principles and policy developments were understood better (Creswell, 2013:20; Mouton, 2005).

5.3.2 Ontology

Ontology refers to all concepts, understanding and principles of a system perceived by the senses and confirmed by experiences (Ameriks and Naragon 1997:7) However, Bloomberg and Volpe (2012:28) refer to ontology as the assumptions based on the nature of reality, in other words, the meaning for something to exist; thus, information regarding Disaster Risk Management (DRM) in the municipalities where the research is conducted may be objective or subjective. Objective DRM information refers to information that really exists, as opposed to subjective information, which is perceived to exist. Thus, the researcher must be aware of what research information or the hard objective facts that are found in the research arena compared to the subjective information, which is influenced by politics, power, culture and other factors.

Therefore, it is important to understand what ontological assumptions rest with the municipalities, especially with the significant Disaster Risk Management stakeholders that form the sample. In this project, a post-positivist ontological paradigm was observed, since the researcher was immersed in the study to a certain extent. Thus, the questionnaires were e-mailed to the respondents after having made face-to-face contact with the respondents. This was done in the form of site visits and attending forum meetings where the respondents were members (Bloomberg and Volpe 2012:28).

5.3.3 Axiology

According to Cresswell (2013:20), ethics relates to either the good or bad, while aesthetics refer to the beauty and/or harmony of a specific phenomenon. Axiology in this study refers to the values people attach to the Disaster Risk Management services as offered by municipalities in the Free State. In the social sciences, the importance of values should not be minimised, since it determines human behaviour (Cresswell, 2013:20). Thus, the attitude and behaviour of Disaster Risk Management officials were significant aspects that were noticeable throughout the province regarding their work experiences. Many Disaster Risk Management officials involved in all the municipalities that the researcher was involved in for this study displayed a sense of ethics and aesthetics. They demonstrated good and bad feelings and beautiful and harmonious relationships, either for the work that they had done or for how they felt

when communities were affected by disastrous events. Sometimes the circumstances and conditions in all three metropolitan municipalities, namely Ekurhuleni, CoCT, the Mangaung Metropolitan Municipality, including all the district and local municipalities are not conducive to delivering effective Disaster Risk Management; however most of these officials showed compassion for the communities in distress. These commendable characteristics of human nature exist amongst our Disaster Risk Management officials. In addition, the knowledge created via this study should make a valuable contribution in the field of Disaster Risk Management. In this regard, it is important to understand axiology, which is the philosophical study of value (Cresswell, 2013:20; McGregor, 2011:113).

5.4 RESEARCH DESIGN AND STRATEGY

The research design and research strategy are outlined in the discussion below.

5.4.1 Research design

Research design can be seen as a general plan or blueprint on how the researcher goes about answering the research questions (Cooper and Schindler, 2003:149). This study followed a mixed approach; therefore, both qualitative and quantitative research methods were used. Mouton (2005:161) and Welman *et al.* (2005:6-7) contend that qualitative research methods reflect certain approaches to knowledge production and include any research that makes use of qualitative data. This is pertinent to this study, which was concerned with information that may resolve the challenges of Disaster Risk Management, within the municipalities in the Free State Province (Cooper and Schindler, 2003:143; Mouton, 2005:161; Welman *et al.,* 2005:6-7).

The literature study for this research project is based on a qualitative study, which includes policy documents, journal articles, books, conference papers, internet sources and government reports on Disaster Risk Management. An empirical study was also conducted by means of administering a structured questionnaire (quantitative) and a semi-structured interview schedule (qualitative). The purpose of quantitative research in this study was to evaluate objective data consisting of numbers and to emphasise the measurement and analysis of causal relationships between variables (Welman *et al.,* 2008:6). The use of the qualitative and quantitative

designs seeks to consolidate or understand the research problem better and to approach the problem from different perspectives (Welman *et al.,* 2008:6).

5.4.2 Research strategy

A research strategy is a plan that the researcher adopts so that systematic and orderly research is produced in an effective manner. In this study, the general systems theory as the research strategy was applied. According to Ingelstam (in Coetzee and Van Niekerk, (2012:1), the characteristics of the general systems theory is ideal for studying multifaceted concepts that are related to the Disaster Risk Management cycle and applicable models. This study included both qualitative and quantitative approaches. According to Welman *et al.* (2008:6-7), there are generally two approaches to knowledge production, either the qualitative or the quantitative approach.

This study carried out an extensive literature review of the many international and national legislative frameworks, published and unpublished theses, academic journals, and books, including information retrieved from websites, meetings and conferences. The information was then used to develop a web-based questionnaire with the assistance of an expert in MultiMedia Instructional Designer. The survey was then e-mailed to the various municipal officials, government departments and other institutions as reflected in the sample to gather mainly quantitative data. However, some open-ended questions were also included in the instrument.

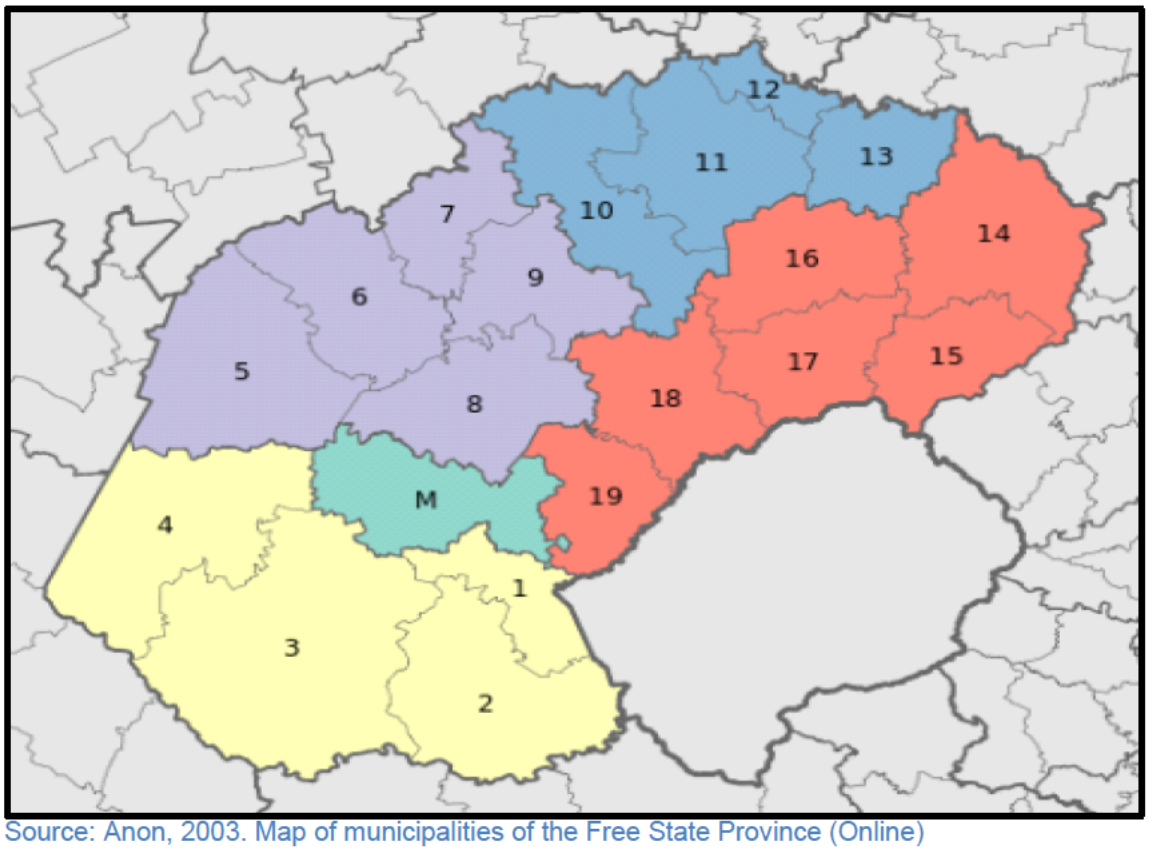
In this regard, the quantitative approach, which is a statistical technique, and deductive by nature, was used to collect numerical data from a larger group of respondents (survey). The reason for quantitative research in this study was to evaluate objective numerical data and to stress the extent and analysis of causal relationships between and amongst the various variables (Welman *et al.,* 2008; Ben-Eliyahu, 2014). Furthermore, the qualitative approach (focus-group interview) concerned itself with studying phenomena from a closer and deeper perspective, with respondents that formed a relatively small group, directly involved in the management of disaster risks (Welman *et al.,* 2008:6-7).

Qualitative research approach is inductive by nature and concerned with personal information such as feelings and behaviour of respondents. This approach assisted in resolving the challenges of Disaster Risk Management within municipalities in the Free State Province. Moreover, both inductive and deductive reasoning as research strategies were followed in this study. Thus, inductive reasoning, which is grounded in theory, was followed to review previously researched Disaster Risk Management literature from different perspectives. However, the deductive strategy was adopted by using a structured survey, with close-ended questions to collect quantitative data. In addition, focus-group semi-interviews were also conducted using open- and closed-ended questions to address the problem statement (Welman *et al.*, 2008:6-7).

5.5 POPULATION

The purpose of this study is to develop an integrated Disaster Risk Management model for the municipalities in the Free State. The population comprised the Mangaung Metropolitan Municipality, the 4 district municipalities and 19 local municipalities within the Free State Province, as indicated in Figure 5.1 below.

Figure 5.1 Map of the Free State indicating the various municipalities



Source: Anon, 2003. Map of municipalities of the Free State Province (Online)

In addition to the municipalities as indicated in Figure 5.1 above, the following government departments, private sector as well as the relevant stakeholders also formed the population.

- The Free State Provincial Disaster Risk Management Centre (FSPDRMC)
- The Free State Provincial Disaster Risk Management Advisory Forum (PDMAF)
- The Joint Operation Centre (JOC)
- Mangaung Metropolitan Municipality Disaster Risk Management Centre (MMMDRMC)
- Mangaung Metropolitan Municipality Disaster Risk Management Advisory Forum (MMMDRMAF)
- The District Municipal Disaster Risk Management Centre (DMDRMC)
- The District Municipal Disaster Risk Management Advisory Forum (DMDRMAF)
- Local Municipal Disaster Risk Management Centre (LMDRMC)
- Cooperative Governance and Traditional Affairs (COGTA-FS) (Director)
- The South African Police Service within the Free State Province (SAPS)
- The South African Defence Force (SANDF), Bloemfontein (JOC Member)
- Free State Provincial Department of Social Development
- Free State Provincial Department of Education
- Free State Provincial Department of Health
- The Emergency Medical Services (EMS – Free State)
- Free State Department of Agriculture
- Free State Treasury
- Transnet (Free State)
- Free State Local Government
- South African Local Government Association (SALGA)
- ESKOM – Free State

5.6 SAMPLING

Sampling is defined as the process of choosing a small group of respondents from a larger, defined target population. The supposition is that the results discovered about

the small group will allow the researcher to draw conclusions relating to the larger group (Hair, Bush and Ortinau, 2006:3-33).

Hence, in this study, the probability random sampling method and the convenience sampling method was used. The random sampling method was used to select 12 local municipalities out of 19 local municipalities randomly (three local municipalities from each of the four district municipalities). In this respect, Leedy (1985:154) contends that randomisation means selecting a sample from the whole population in such a way that the characteristics of each unit of the sample approximate the characteristics of the total population (Leedy 1985:154).

Furthermore, Salkind (2009:90-91) asserts that the most common type of probability sampling procedure is the simple random sampling method. In this sampling method, each member of the population has an equal and independent chance of being selected as the sample. In convenience sampling, respondents are selected on the premise that they were readily available or easily accessible (Welman *et al.,* 2008:69-70). This method was used to select representatives from various government departments, forums and other stakeholders as indicated from the population for the purposes of the semi-structured interviews (Welman *et al.,* 2008:69-70; Salkind 2009:90-91).

In addition to using the interview schedule to conduct semi-structured interviews with the aim to collect qualitative data, a structured questionnaire (survey) was used to elicit information from the Disaster Risk Managers of the metropolitan, district and local municipalities as listed below:

- Mangaung Metropolitan Municipality
- Xhariep District Municipality
- Lejweleputswa District Municipality
- Fezile Dabi District Municipality
- Thabo Mofutsanyane District Municipality
- Naledi Local Municipality
- Mokohare Local Municipality
- Kopanong Local Municipality

- Tokologo Local Municipality
- Tswelopele Local Municipality
- Nala Local Municipality
- Moqhaka Local Municipality
- Ngwathe Local Municipality
- Metsimaholo Local Municipality
- Nketoana Local Municipality
- Maluti-a-Phofung Local Municipality
- Phumelela Local Municipality

As indicated in Chapter 6.6.2, semi-structured interviews by means of an interview schedule were also conducted with a senior representative (managers and other senior officials) from the following government departments, centres, forums and other stakeholders:

- The Free State Provincial Disaster Risk Management Centre (FSPDRMC)
- The Free State Provincial Disaster Risk Management Advisory Forum (PDMAF)
- The Joint Operation Centre (JOC)
- Mangaung Metropolitan Municipality Disaster Risk Management Centre (MMMDRMC)
- Mangaung Metropolitan Municipality Disaster Risk Management Advisory Forum (MMMDRMAF)
- The District Municipal Disaster Risk Management Centre (DMDRMC)
- The District Municipal Disaster Risk Management Advisory Forum (DMDRMAF)
- Local Municipal Disaster Risk Management Centre (LMDRMC)
- Cooperative Governance and Traditional Affairs (COGTA-FS) (Director)
- The South African Police Service within the Free State Province (SAPS)
- The South African Defence Force (SANDF), Bloemfontein (JOC Member)
- Free State Provincial Department of Social Development
- Free State Provincial Department of Education
- Free State Provincial Department of Health

- The Emergency Medical Services (EMS – Free State)
- Free State Department of Agriculture
- Free State Treasury
- Transnet (Free State)
- Free State Local Government
- South African Local Government Association (SALGA)
- ESKOM – Free State
- South African Weather Service (Bloemfontein)
- SASSA – Free State (Provincial)

The 22 semi-structured interviews were conducted using open-ended questions. The respondents as provided in Chapter 1 and in Chapter 5.7 of this study represented the South African National Disaster Risk Management Centre, The CoCT Metropolitan Municipality, from the Western Cape Province, the Ekurhuleni Metropolitan Municipality from the Gauteng Province and the Mangaung Metropolitan Municipality from the Free State. In addition, interviews were also conducted with a sample from the Free State Province: The Provincial Disaster Management Centre, the Metropolitan Municipality, and the Fezile Dabi, Lejweleputswa, and Xhariep District Municipalities, eight provincial departments, one parastatal and one nongovernmental organisation. The sample was further broken down as follows:

- Two focus group interviews were held with the Free State Provincial Disaster Risk Management Advisory Forum.
- One face-to-face interview was held with a senior Provincial Disaster Risk Management official.
- Three focus group interviews were held with the Free State Disaster Risk Management Advisory Forum representing the Lejweleputswa, Xhariep and Fezile Dabi Disaster Risk Management Centres.

In total, 10 focus-group interviews with institutions and organisations in the Free State were conducted as represented below:

- Fire Protection Unit at Dewetsdorp (3 members)
- SAPS Free State (3 members)

- Free State Provincial Joint Operation Centre (3 members)
- FS Department of Social Development (4 members)
- FS ESKOM (2 members)
- FS Department of Agriculture (4 members)
- FS Group 1 – Department of Rural Development and Land Affairs (3 members)
- FS Group 2 – Department of Rural Development and Land Affairs (3 members)
- FS Public Works, Roads and Transport (2 members)
- FS South African Weather Service (2 members)

Although some officials responsible for DRM in the Fezile Dabi District voluntarily participated in the study, the manager at the Fezile Dabi District, Disaster Management centre did not want to play any role in the interview. No reasons were provided and this was accepted, since all participation was voluntary. A dictaphone as well as a mobile cellular phone was used to record the responses of the respondents.

5.7 RESEARCH INSTRUMENTS

According to Saunders *et al.* (2009:395), the selection of a research instrument depends on the purpose of the research. For the purposes of this research, a self-administered structured questionnaire was developed. In this respect, there are two types of questionnaires, namely a self-administered questionnaire and an interviewer-administered questionnaire. A self-administered questionnaire is a data collection strategy in which the respondents read the questions, then choose their preferred answer and record it in the absence of the interviewer. For the purposes of this study, permission was granted to modify and use some of the questions from the SALGA Research Report, 2011 (Saunders *et al.,* 2009:395).

Hence, a self-administered structured questionnaire was sent through electronic mail to the various district and local municipalities. This included the Mangaung Metropolitan Municipality, which formed the sample. The manager responsible for Disaster Risk Management in the Free State district and local municipalities completed the structured questionnaire and returned it via e-mail. Furthermore, an interview schedule consisting of structured (closed-ended) and unstructured (open-ended) questions was used to conduct semi-structured interviews.

According to Salkind (2009:144-145), semi-structured interviews are more flexible for both the interviewer and the interviewee. This flexibility allowed the interviewer to probe for more information, and to get a better understanding of the information, facts and uncertainties, provided by the interviewee. For the purposes of this study, the semi-structured interviews were conducted with senior officials from the government departments, the business sector and non-governmental sector involved with disaster risk reduction (Salkind, 2009:144-145).

In this regard, the following suggestion made by Tsatsire (2008:230) was taken into consideration when the structured questionnaire was compiled:

- Confidentiality should be assured – this was stated on the questionnaire.
- Where applicable, a choice of answers was provided on the questionnaire;
- The layout of the questionnaire is important, and provision for adequate space for answers was made
- The questions formulated were not of an offensive nature.
- Care was taken to avoid questions giving rise to answers of an emotive nature;
- Questions requiring any form of calculations were avoided; and
- All questions formulated were short, simple and to the point.

The structured questionnaire for the purpose of this study was designed to have fully structured statements. Confidentiality was assured and obtained by using a covering letter for both the self-administered structured questionnaire and the interview schedule.

The instrument that entailed mostly closed-ended questions, with a few open-ended questions, was e-mailed to the municipal Disaster Risk Management officials in the various districts of the Free State Province. In addition, the structured questionnaire was also sent by electronic mail to government and other departments and organisations that are associated with Disaster Risk Management, in the Free State Province.

5.7.1 Surveys

A self-administered structured questionnaire was designed to have fully structured statements and questions that were completed by the various municipalities as indicated in the sample. These self-administered structured questionnaires contained open-ended and close-ended questions that were distributed amongst the Free State district and local municipalities as indicated in the sample, via e-mail. In addition to the Lejweleputswa and Thabo Mofutsanyana Districts, which formed the sample, the survey was also mailed to the remaining two districts – Fezile Dabi and Xhariep districts. Regarding the local municipalities, although three local municipalities from each district (12 municipalities) formed the sample, the structured questionnaires were distributed via e-mail to all 19 local municipalities.

Since the various municipalities were grossly understaffed, it took almost two months for all the respondents to complete the structured questionnaires. In some instances, where there was lack of staff, other officials closely allocated DRM responsibilities were requested to complete the questionnaires. The researcher monitored and followed up the completion of the structured questionnaires, for each municipality in every district. The respondents were reassured of confidentiality and that they were free to start when they had the time to do so. They were also assured to feel free to stop with the process, if they so desired. Of the four districts and the one metropolitan municipality, all the respondents were very comfortable to be part of the research process, except for the officials from the Fezile Dabi District Municipality. Surprisingly, of the expected number of responses, which was zero from this district and three local municipalities, two completed the structured questionnaires.

5.7.2 Interview schedule

A structured questionnaire was used as an instrument to collect numerical data (quantitative approach). However, for the qualitative approach, the literature reviews and the semi-structured interviews were used to collect narrative data.

The mixed-method approach was found to be suitable for this study because it accommodated a deeper understanding of Disaster Risk Management. Furthermore, the mixed approach accommodated the differences and limitations presented by the

surveys as well as the interviews. In this way rich, deep and authentic research findings were secured (Kgakatsi and Rautenbach, 2014:104; Williams, 2007: 73-75).

5.8 NEXUS: LITERATURE REVIEW AND EMPIRICAL STUDIES

The literature review for this study is discussed in Chapter 2, 3 and 4 of this study and the empirical findings are discussed in Chapter 6 of this study. According to Trafford and Leshem (2008:68), the literature is a specific body of knowledge that is recognised by a target consumer. Disaster Risk Management in this study is the body of knowledge and the target users of the knowledge are Disaster Risk Management officials, practitioners and academics. However, the literature review on Disaster Risk Management is an overview of the trends, debates, the past and current thinking, definitions and discussions (Trafford and Leshem, 2008:68).

In the light of the above, at an advanced academic level, the researcher needs to interact with the literature. This may be done in one of three ways: firstly, the different viewpoints may be described and discussed; secondly, engagement by way of justification and argument for the research design and methodology; and finally analyse, interpret, describe and discuss the findings of the research. Consequently, in this study analytical reading (literature review in Chapters 2, 3 and 4) was done, followed by the synthesising of ideas and reworking of theories (interviews in Chapter 6) in most instances (Trafford and Leshem, 2008:68).

In this regard, the primary sources in this review of literature were government legislation and reports, secondary sources were academic journal articles, books, theses, and web based sources. In this study, previous studies about DRM were also summarised and organised and consequently, the theoretical and conceptual frameworks for this study were developed. The interviewee responses discussed in Chapter 6 were cross-referenced with the literature reviews in Chapter 2, 3 and 4 for triangulation and validation.

5.9 PRE-TESTING QUESTIONNAIRE

A pilot study is conducted to assess the quality of the research instrument and data feedback. According to Robson (2002:59), a pilot study is a trusted method of

establishing “what is happening, to seek new insight, to ask questions and to assess phenomena in a new light, prior to the substantive research”. Moreover, the questions must be designed in a way that the respondents are certain of what is expected from them. Questions leading to ambiguity and vagueness were avoided at all costs (Robson, 2002:59).

The assistance of an expert in questionnaire development, Professor A. Nel, from the Department of Psychological Services, University of the Free State was sought. Thereafter, assistance was sought from subject matter experts. In this regard, the Director of Disaster Risk Management from the University of the Free State, Professor A. Jordaan and Professor L. Lukamba, from the North-West University: specialist in Energy Policy, Public Sector Reform, Public/Private Partnership and Disaster Risk Management offered their expert advice. Suggestions and recommendations offered by these specialists were factored into the instrument.

In addition, the Manager of the Bloemfontein Nursing College, who is an Emergency Management Services specialist, assisted in the pilot study. In this way, expert advice was sought from the Provincial Disaster Management Advisory Forum and the Mangaung Metropolitan Municipality Advisory forum. Thus, sufficient expert advice was received ad the changes were made to the survey.

Finally, the structured questionnaire was discussed and refined with the assistance of the statistician who is an expert in statistical analysis. Some existing inconsistencies, ambiguities and uncertainties regarding the instruments were corrected before the actual research was conducted. The purpose of this rigorous pre-testing of the questionnaire was to ensure the validity and reliability of the instruments (Robson, 2002:59).

5.10 DATA COLLECTION

5.10.1 Computer-aided programmes

QuestionPro, the preferred Computer Aided Programme used to disseminate the structured questionnaires for this study, is a programme that was used as a data collection instrument for the purposes of this research. It is very user friendly, easy to

design and respond to, using either an iPad, cellular phone, tablet computer or a computer (Desktop/laptop). The programme is accessible to respondents anytime and anywhere. The researcher was able to monitor the progress of the respondents wherever in the world the survey was being completed. In addition, the researcher was able to track specific respondents, whether it was from a local, district or metropolitan municipality. Thus, it was easy to follow up and prompt officials who had indicated their willingness to participate, but who were for some reason unable to complete the structured questionnaires.

QuestionPro accommodated quantitative and qualitative responses. In addition, the programme updated itself every time new respondents started the structured questionnaires. It also provided for real-time summary reports and was easily exported to the Excel and Statistical Program for Social Sciences (SPSS). In this way, the program allowed for the vigorous analysis and rigour of the report.

Semi-structured interviews with open-ended questions were also used in this study. The purpose of the semi-structured interviews with open-ended questions in this study was to collect thick data, which included recording human behaviour and feelings to describe the phenomena in detail.

Semi-structured interviews were conducted with officials from government and municipal departments including other institutions such as ESKOM and Red Cross. In addition to collecting data by posing open-ended questions, the purpose of the semi-structured interviews was to observe the behaviour and better understand the feelings of DRM practitioners, in their natural environment.

Tsatsire (2008:229) states that there are various methods of collecting data, namely a questionnaire, personal interviews, observation of events as they happen, and abstraction amongst others. According to Salkind (2009:142), a questionnaire is a form that contains a set of questions based on the research project, which needs to be completed by the respondents. Bless and Higson-Smith (1995:106-107), on the other hand, assert that a questionnaire is a data collection instrument that consists of a standardised set of questions. These questions, which are relevant to the research topic, have to be answered in writing by the respondents (Tsatsire 2008; Bless and Higson-Smith, 1995).

5.10.2 Preliminary steps

Disaster Risk Management officials were briefed about the purpose of the research. The briefing included anonymity, confidentiality and voluntary participation in the research process. Thereafter the structured questionnaire using the QuestionPro programme was electronically mailed to the various respondents for completion. In the beginning, the completion rate was very slow and after being prompted telephonically, the response improved. The structured questionnaire was monitored on a weekly basis to establish the completion rate. When sufficient data were collected, which lasted for a two-month period (April 2017 to May 2107), the answering of the structured questionnaire was stopped.

One of the basic tools used in qualitative research is the interview schedule. Interviews can take the form of an informal question-and-answer session or a structured, detailed interaction between the interviewer and interviewee (Salkind, 2009:194-195). Again, Salkind (2009:195) emphasises that interviews contain two general types of questions, namely structured (closed-ended) and unstructured (open-ended) questions. In addition, Brynard and Hanekom (2006:40-41) also assert that interviews are one of the most frequently used techniques for collecting data because the researcher can explain the questions if the respondents do not understand them. In this study, the semi-structured interviews were conducted using an interview schedule (Brynard and Hanekom, 2006:40-41; Salkind, 2009).

For the purpose of this study, senior representatives from the Free State government departments, DRM Centre, DRM forums and other stakeholders as indicated in the sample were interviewed. Where officials were not available for a face-to-face interview, a telephonic interview was conducted.

5.10.3 Data Analysis

According to Leedy and Ormrod (2005:148-150) data analysis is a continuous process of describing, classifying and interpreting data. In this study, both quantitative and qualitative research approach was followed in the data collection process.

Hence, qualitative data analysis is the conversion of raw data into valuable, meaningful information for the researcher. Because of this, various categories of data were grouped together. Thereafter, the relationship that exist between and amongst be specific were identified to make sense of and construct theory thereof. Henning, Van Rensburg and Smit (2004:6-7) maintain that the process of data analysis will assist the researcher in answering the research questions and to achieve the purpose of the research. In the course of organising the data trends, themes and/or contradictions emerged. These patterns were highlighted for readers to note and for the researcher to follow up on (Brassington and Petit, 2013:1-2).

In this study, the researcher was assisted by an experienced statistician in qualitative and quantitative research methodologies. The assistance was firstly, to develop the structured questionnaire and the semi-structured interview schedule; secondly, to provide guidance in collating, interpreting and analysing the results from the data collection instruments. As indicated in the sample, the instruments referred to in this study, are the self-administered structured questionnaire and semi-structured interview schedule.

However, the Statistical Package for the Social Sciences (SPSS) is a computerised program that was used to process statistical data. Recently, it has become popular in other fields of study such as health sciences, education, researchers. It is also useful in the management of data. Other statistical methods usable in this software include:

- Descriptive statistics for frequencies, cross tabulation and cross ratio statistics
- Bivariate statistics for analysis for variance (ANNOVA), means and correlation
- Numerical outcome prediction – linear regression
- Prediction for identifying groups – cluster analysis (k-means, two-step, hierarchical), factor analysis

Data analysis included a description as well as a summary of the information obtained from the questionnaire and interview schedule. Simple graphs, bar charts, tables and percentages are used to present data, which could be viewed from different perspectives. Thus, anomalies were identified and pursued. Consequently, the data obtained from the literature study, as well as from the empirical study contributed to the development of an integrated Disaster Risk Management model for municipalities

in the Free State Province. However, the Cronbach's Alpha was used to establish internal consistency in this study (Available: Anon: www.techopedia.com. Accessed: 7 June, 2017).

5.10.4 Reliability

According to Mafini (2013:156), reliability and validity are two important elements that are used to determine the correctness (Mafini 2013:156), of measuring instruments in a research project. Moreover, these elements ensure the accuracy levels of the data collected and, in this way, improve the overall quality of the research. However, according to Golafshani (2003:59-607), the concepts reliability and validity have different meanings for the various research approaches. In this regard, the instrument (questionnaire) used to collect quantitative data consisted of many items and statements, all of which were consistent and reliable (Golafshani, 2003:59-607; Mafini, 2013:156).

Furthermore, Gliem and Gliem (2003:33) state that reliability in the quantitative approach refers to using the same instrument, constantly every time, with the same subjects, under the same conditions and getting similar results. Thus, it could be argued that reliability refers to the trustworthiness of the measurement. In this case, trustworthiness refers to the closeness or similarities of estimates that have been obtained after repeated tests, which is referred to as the re-test method (Gliem and Gliem, 2003:33).

According to Du Plooy-Cilliers *et al.* (2014:254), reliability is connected to the findings of a research project. By ensuring that a method or research instrument is reliable, the researcher have to ask whether the same results would be produced if the research were to be repeated by a different researcher at a different time using the same method or instrument. One could argue that reliability is about the fact that when different research respondents are tested by using the same instrument at different times they should respond in the same way to the questions in the research instrument. In quantitative studies reliability demands consistency and therefore it is about credibility of the research. Reliability in the quantitative approach refers to using the same instrument, constantly every time, with the same subjects, under the same conditions and getting similar results. Thus, it could be argued that reliability refers to

the trustworthiness of the measurement. In this case, trustworthiness refers to the closeness or similarities of estimates that have been obtained after repeated tests, which is referred to as the re-test method (Du Plooy-Cilliers *et al.,* 2014:254).

Du Plooy-Cilliers *et al.* (2014:255) further argue that there are different types or forms of reliability in quantitative research that are briefly discussed below:

- **Inter-Rater or Inter-Coder:** This type of reliability is a measure of agreement. The test for reliability relies on using the same instrument but it is tested with different respondents.
- **Test-Retest:** It is known as a test that measure stability. The same instrument and Respondents are used but the instrument is administered at different times.
- **Parallel Forms:** This type of reliability is a measure of equivalence. The test for reliability relies on using different respondents and different instruments or methods are used during the same time.
- **Split Halves:** It is also a measure of equivalence. The method or instrument is split into two equivalent halves and but the researcher collate the scores together.
- **Internal Consistency:** Internal consistency is used to measure on how consistently each item measures the same item (Du Plooy-Cilliers *et al.,* 2014:255).

In this study, the same structured questionnaire was used at different times with different respondents; therefore, one could argue that an inter-rater or inter-coder method was used as to establish reliability of the instruments. The same structured questionnaire was also sent to different participants in different municipalities at different times within the Free State Province. For this reason, one could argue that the internal consistency test of reliability was also applied during the pilot study as discussed in Section 5.9 of this chapter.

- The Cronbach Alpha

Another method of estimating reliability is by ensuring that there is internal consistency. In this regard, there may be two or more sets of questions relating to the same concept, which are then grouped together. Mafini, (2013:157) proposes that the

responses from the different sets of questions are linked (correlated) to establish whether the instrument is reliable. Thus, to achieve internal reliability and consistency of the various items in the questionnaire, especially when applying a Likert-type scale, the Cronbach's alpha is preferred. The Cronbach's alpha is a computer program in which the values are assigned to responses, which are then correlated for consistency and reliability (Mafini, 2013:157).

According to Singh (2014:143), the Cronbach's alpha is a statistical test that splits the questions in different ways and calculates values for each of them. This value is called the coefficient correlation or the reliability coefficient, which normally ranges between 0 and 1.0. There is no lower limit to the coefficient and the closer it is to 1.0, the greater the reliability.

Table 5.3 indicates the Cronbach's Alpha and the interpretation thereof, such as achieving a coefficient reliability score of 0,9 is excellent and 0,4 is unacceptable.

Table 5.3: Interpreting internal consistency using Cronbach's Alpha

Internal Consistency	**Cronbach's Alpha**
Excellent:	< 0,9
Good:	< 0,8
Acceptable:	< 0,7
Questionable:	< 0,7
Poor:	< 0,5
Unacceptable:	< 0.4

(Source: Gliem and Gliem, 2003)

For this study, four items in the questionnaire were used to achieve internal reliability and consistency. The reliability coefficient for this study ranges from 0,63 to 0,86 as indicated in Table 5.4 below.

Table 5.4 Cronbach's (alpha) Coefficient: Disaster Risk Management questionnaire

Questionnaire section	Respondents (alpha) coefficient
Rate the functioning of Disaster Risk Management in your municipality	0,86
Rate the level of compliance of your institution with the *Disaster Management Act of 2002*	0,82
Rate the Disaster Risk Management services provided by the centre with which you are mostly involved	0,67
Rate the functioning of the Disaster Risk Management Assessment Forum with which you are involved.	0,63

(Source: Researcher's own interpretation)

Table 5.4 indicates the items tested for internal consistency and the respondent's coefficient achieved. Thus, the Cronbach's Alpha for this study is 0,74 (Gliem and Gliem, 2003:33; Singh, 2014:143).

5.10.4.1 Reliability in qualitative approach:

Although reliability refers to understanding of the quality of estimates in a quantitative methodology, with the view to providing an explanation, in qualitative approach, dependability is the measure of quality, mostly accepted. Since dependability and trustworthiness are closely related, both concepts measure the quality of a research project. Thus, reliability of a qualitative research project is reliant on the degree of trustworthiness and dependability of the findings for its validity (Singh, 2014:142).

5.10.5 Validity – qualitative approach

Reliability and validity have different meanings in the social sciences. Reliability refers to obtaining very similar estimates in repeated tests whilst validity refers to the instrument measuring what it stated it would measure. If the instrument measures what it was supposed to measure, then it may be regarded as being valid (Phelan and Wren, 2007:6; Singh, 2014:142).

However, three types of validity: content validity, construct validity and sampling validity were used in this study.

5.10.5.1 Content validity

A concept that refers to the validity of the content of the instrument. In this regard, the instrument covered all the important aspects that were to be measured. The research aim, objective and research questions were carefully studied when the instrument, the interview schedule and the questionnaire were administered. Moreover, the questions were pre-tested by research specialists, as well as subject matter experts to ensure that the important elements of the phenomenon under review were covered (Phelan and Wren, 2007:6).

5.10.5.2 Construct validity

To ensure construct validity, the advice and support of experts were enlisted. Firstly, the instruments were adapted from previous studies for which permission was obtained. Secondly, the advice and suggestions of subject matter experts were included. The role of the experts was to ensure that the instruments measured the main concepts, within the theoretical framework of the study, which was going to be measured. This was to ensure construct validity (Phelan and Wren, 2007:6).

5.10.5.3 Sampling validity

Firstly, sampling validity was ensured by ensuring that the instrument covered the main concepts of the study. Secondly, the appropriate sampling method was used and, in addition, the sample size represented the population adequately. In this regard, the instrument, sample size and instrument were comparable to other scientific studies of a similar nature (Phelan and Wren, 2006:6).

5.10.6 Rigour of research using non-traditional methods

Some researchers dispel the notion of validity that is very often associated with quantitative research because of their philosophical beliefs. They believe that the quality of research may be evaluated using other criteria as indicated by the Table 5.5 below.

Table 5.5 Rigour of research using non-traditional methods

Traditional criteria for judging quantitative research	Alternative criteria for judging qualitative research
Internal validity	Credibility
External validity	Transferability
Reliability	Dependability
Objectivity	Confirmability

(Source: Phelan and Wren, 2006:6)

Table 5.5 above compares traditional and non-traditional methods to show rigour of the research. Phelan and Wren (2006:6) propose using four criteria to enhance the value of qualitative research. Internal and external validity, reliability and objectivity are traditional criteria, which may be compared to credibility, transferability, dependability and confirmability. This comparison, which is an alternative method of judging soundness of qualitative research, is demonstrated in Table 5.5 below (Phelan and Wren, 2006:6).

Since this study followed a mixed approach, content validity was used for the quantitative approach and triangulation was used for validity in the qualitative approach.

Thus, the reliability of the research project was improved by triangulating the data ensuring a rigorous process. The use of triangulation to ensure credibility, transferability, dependability and confirmability is explained in the next section.

Credibility: In qualitative research, credibility refers to the notion of how believable the findings are and this can only be judged by the respondents (Phelan and Wren, 2006:6).

Transferability: Refers to the extent to which the research results could be transferred to other situations taking into account the context and assumptions within which the research is carried out (Phelan and Wren, 2006:6).

Dependability: Refers to repeatability achieving the same results if the research is carried out again under similar conditions (Phelan and Wren, 2006:6).

Confirmability: Refers to the research findings that are confirmed by others Phelan and Wren, 2006:7; Available: Anon:www.socialresearchmethods.net Accessed 18 May 2017).

5.10.7 Triangulation

Tichapondwa (2013:110) argues that using the quantitative and qualitative approaches (mixed approach) in this single study has significant advantages and limitations (Borg and Gall, 1996; Creswell, 2007; Johnson and Onwuegbuzie, 2004; Tashakkori and Teddlie in Maree 2007). By corroborating the findings using the mixed approach in this study confirms triangulating the qualitative and quantitative methods, which offer a more comprehensive view of the findings (Tichapondwa, 2013:110).

However, using both approaches should not be reduced to procedures or "mixing", since both methods are based on conflicting epistemological or ontological traditions (Hammersley, 2009:22-23). Therefore, triangulation is endorsing interpretation or crosschecking (Bergman, 2010:23) or other sources of data collection, but not combining the two approaches (Hammersley, 2009:22-23; Bergman, 2010:23).

For the purposes of this study, the support an independent expert in statistical analysis was sought in the design and layout of the structured questionnaire. It was then, examined by subject matter experts, whose suggestions and recommendations were factored into the structured questionnaire. Furthermore, the advice of Disaster Risk Management practitioners and the promoter of this research project also contributed to the quality of the research instrument. The advice from a practitioner and the promoter of this research were included in the questionnaire. The findings of the quantitative data are consistent with the findings of the qualitative data, which suggests that the findings went through a rigorous process to ensure credibility, transferability, dependability and confirmability. For this reason, the quantitative and the qualitative findings were cross-referenced as reflected in Chapter 6 of this study to discuss triangulation.

5.11 JUSTIFICATION FOR THE STUDY

Disaster Risk Management (DRM) is a multisectoral, multidimensional (DMA, 2002) and a complicated management activity. It cuts across all departments and entities, all of which have a specific contribution to make in minimising the impact of disasters. Hence, every stakeholder, department and/or entity must have the capacity to ensure that Disaster Risk Management is carried out successfully. However, the seemingly complicated nature of complying with the requirements of the DMA (2002), the NDMF (2005) and the numerous other legislative frameworks makes it a daunting task. Moreover, the lack of information and adequate resources for the effective functioning of DRM, in most of the metropolitan municipalities in South Africa, adds to this ineffectiveness.

This study makes a valuable contribution in proposing that Disaster Risk Management must be a much more implementable service delivery imperative. The many sectors, departments, entities and the public at large are not Disaster Risk Management specialists and therefore it will be easier to understand a DRM model Management without the technical jargon. For this reason, the three most important components to be understood are Operations Management, which refers to the overall management of disaster risks; secondly, Hazard Analysis, which deals with identifying and analysing hazards prevalent in the municipality concerned; and thirdly, Risk Management, which deals with the management of the identified risks.

Firstly, a hazard analysis has to be conducted. This means that there must be consensus amongst all stakeholders of the prevalence of the most common hazards that are prevalent in the community. Secondly, there must be an understanding of the risk factors (Hazard Analysis) that these hazards pose to the community, the environment and/or the economy; and thereafter treat the risks (Risk Management). Finally, both Hazard Analysis and Risk Assessment must be managed – this is called Operations Management.

For this reason, it is preferred that the head of Disaster Risk Management Centres holds a qualification of no less than a level six on the National Qualification Framework (NQF). This qualification is sufficient for officials to manage the operations of a Disaster Risk Management Centre.

The main principles of Disaster Risk Management are to ensure the reduction of disaster risks. Therefore, other government departments and entities need to understand what the requirements are for effective Disaster Risk Management. For instance, the capacity to manage urban floods or mudslides by a relevant department other than the Disaster Risk Management officials must not be underestimated. For example, should a major multiple vehicle accident occur in a metropolitan area, this incident will be managed one way or the other. However, if the community were trained to manage an event of this nature at least they would be prepared to some extent. The Emergency Management Services and/or the Department of Public Works, Roads and Transport are best suited to build capacity of the communities to manage motor vehicle accidents. They have the necessary skills and knowledge regarding standard operating procedure (SOP) to build capacity within the community.

In this regard, it is the responsibility of the DRM officials to ensure that all stakeholders are aware of their roles and responsibilities for the effective management of disasters. The proposed integrated Disaster Risk Management model has been designed to understand the Disaster Risk Management concepts and the roles and responsibilities of DRM officials. The basic minimum requirements by all stakeholders for effective DRM services are to understand the following three concepts:

- Hazard Analysis
- Risk Assessment
- Operations Management

Once the DRM officials understand the functioning of these three concepts, they must ensure that all stakeholders within their jurisdiction are familiar with the functioning of the proposed integrated Disaster Management model.

Another important contribution of the proposed integrated DRM model is that it provides a unified framework for the common understanding of the basic tenets of DRM. In this way, this study contributes to the general body of knowledge in Disaster Risk Management. It also envisages assisting DRM officials in the Free State municipalities in managing disaster risks effectively, and in doing so protect the most vulnerable communities in the Free State. The proposed DRM model for this study is discussed in Chapter 6.8.4 and in Chapter 7.6 of this study.

5.12 CONCLUSION

The focus of this chapter is on the research methodology, research design, research philosophy and the research strategy to collect data. The data were then analysed to achieve the research objectives and in this way the research problem as outlined in Chapter 1 was answered. A comparative analysis of the quantitative and qualitative strategies was conducted to demonstrate the usefulness of both strategies in this single study. Furthermore, the research methodology, which is the general approach that the researcher used to carry out the research project and which was dictated by how the specific tools such as the use of the library, computer programmes, measurement techniques, statistics, questionnaires, interviews and language that was selected for this research, was discussed (Leedy and Ormond, 2005:12).

The three research approaches, the quantitative, qualitative and the mixed approach, were compared and discussed. The qualitative research focused on the underlying characteristics of subjective experiences and the various meanings associated with a particular phenomenon. The quantitative research process was deductive and objective, where the researcher remained distant from the phenomenon that was researched. In this way the relationship amongst the variables were compared. According to Tichapondwa (2013:110), the mixed approach consists of quantitative and qualitative methods in a single study. It complements and offers a much more holistic understanding of the phenomenon under review. Using both the approaches in a single study is referred to as the “mixed approach, which is also known as multiapproach, pragmatism or triangulation.

In this study, the general approach to do research was referred to as the research paradigm, or the manner in which research the research was conducted. The research paradigm was a specific scientific process that was followed based on the researcher’s philosophies and assumptions about a phenomenon (DRM). These assumptions were further defined by concepts such as epistemological and ontological stances which were discussed in detail and which indicated the researcher’s worldview in the Disaster Risk Management. In this study, the positivist paradigm was used in the quantitative research whilst the interpretivist paradigm represented the qualitative approach. The use of both qualitative and quantitative methodology, which this study used, was referred to as the pragmatic paradigm (mixed research).

The research design and strategy were then discussed, which highlighted the data collection process, using the structured questionnaire for the quantitative research and the semi-structured interviews for the qualitative research. A detailed description of the sample was used for this research. The internal and external validity, reliability and objectivity as traditional quantitative criteria versus the alternative credibility, transferability, dependability and confirmability for judging soundness of qualitative research were also discussed (Phelan and Wren, 2007). The chapter ended with the justification of the study, which discussed the value and the contribution of the study. The proposed integrated Disaster Risk Management model was designed to make understanding of the three main elements of Disaster Risk Management easier. The common understanding of these three elements, namely Operations Management, Hazard Analysis and Risk Management will promote the implementation of effective Disaster Risk Management services as discussed earlier in this chapter.

The next chapter presents the empirical findings and analysis of this study.

CHAPTER SIX: DATA ANALYSIS AND INTERPRETATION OF DATA COLLECTED

6.1 INTRODUCTION

The aim of the study is to contribute positively to the improvement of Disaster Risk Management within municipalities in the Free State Province. This was achieved by developing a proposing an integrated Disaster Risk Management Model that would assist municipalities in the Free State Province to plan, implement and manage disasters risks effectively. In order to achieve the aim of the study, the preceding chapters (Chapter 2 to 4) outlined the theoretical framework for the study. An in-depth literature study (Chapter 2, 3, 4) and an empirical study (Chapter 6) were conducted, with the aim of achieving the research objectives and answering the research problem, which is outlined in Chapter 1.6.1 of this study.

This chapter focuses on the results obtained from the empirical research, discusses the findings of the empirical research, and subsequently interprets the findings in order to make recommendations. The information obtained from the theoretical framework was used to develop a structured questionnaire, which was used in the empirical study. The Provincial Disaster Management Centre, The Mangaung Metropolitan Municipality, the 4 district and 19 local municipalities comprised the sample for this study. The names of the district and local municipalities and government departments (sample) are reflected Chapter 1.7.7 and 1.7.8 of this study. This chapter also presents the findings and analysis of data obtained from the semi-structured interviews with senior disaster management officials of the Provincial Disaster Management Centre, The Mangaung Metropolitan Municipality, the 4 district and 19 local municipalities, the sample for this study.

The description of the respondents is outlined in the next section, followed by a discussion of the data analysis and subsequently the empirical research findings.

6.2 DESCRIPTION OF THE RESPONDENTS

The population and sampling used in this study was discussed in Chapter 1.7.7 and 1.7.8, as well as in Chapter 5.7 of this study.

The respondents are senior Disaster Management officials based at the various spheres of government in the Free State Province. Some respondents represent sectoral departments in Disaster Risk Management in the Provincial Disaster Risk Management Advisory Forum.

A self-administered structured questionnaire (quantitative) was e-mailed to all disaster management institutions in the Free State Province. In total, 12 respondents from the 19 local municipalities, 2 respondents from the 4 districts, 1 respondent from the Mangaung Metropolitan Municipality, one respondent from of the Provincial Disaster Management Centre and 13 officials from the 20 sectoral departments completed the questionnaires.

The self-administered structured questionnaire was the data collection strategy where the respondents read the questions, recorded their preferred answer and e-mailed it back to the researcher. For the purposes of this study, permission was granted to modify and use some of the questions from the SALGA Research Report, 2011 (Saunders *et al.,* 2009). These self-administered questionnaires were sent through electronic mail to the various district and local municipalities, the Free State Provincial Disaster Management Centre, the Mangaung Metropolitan Municipality and the Free State Provincial Government Departments, which formed the sample. The manager and or the senior official responsible for Disaster Risk Management in the municipalities and the departments completed the questionnaires and returned them via e-mail to the researcher.

6.3 DATA PREPARATION OF STATISTICAL DATA ANALYSIS

The data preparation process began by screening of the raw data, cleaning and preparing it for accuracy. Whilst the incomplete structured questionnaires were separated from completed ones, stored in a folder and rechecked, the completed structured questionnaires were then crosschecked to ensure that all-important questions were answered and that the responses were complete. Thereafter, the assistance of the statistician was sought to extract the raw data from the QuestionPro programme and exported to the Statistical Package for Social Sciences Programme (SPSS) in preparation for the data analysis. The data analysis processes involved reliability tests, regression analysis, correlation analysis, mean and frequency

distribution. The statistician then assisted to double-check for descriptive and inferential statistics, including frequency and percentage distribution. One anomaly with the respondents' age was found, which was then corrected.

6.3.1 Descriptive statistics: Quantitative

Descriptive statistics refers to the conversion of raw data into a clear, logical and understandable format. Furthermore, it provides for a basic understanding of how data are evaluated using simple graphics, describing the data and discussing what it shows. The information identified during the descriptive analysis stage, forms the basis for later complex analysis and assumptions. Quantitative data are used as descriptive statistics to summarise the main themes and to present any deviances from the average. This conversion of descriptive statistics was done in the early stages of empirical data investigation using different tools and techniques such as mean, variance and frequency distribution (Polonsky and Walker, 2011:230).

6.3.1.1 Frequency and percentage distribution:

In the opinion of Polonsky and Walker (2011:230), frequency, refers to the number of responses or occurrences, of a phenomenon to a specific question. Furthermore, Polonsky and Walker (2015:230) and Ngcamu (2011:139) conclude that frequency distribution provides an overall picture of the distribution, including the minimum and maximum responses. Similarly, Ngcamu (2011:139) is of the view that frequencies refer to the number of objects or respondents in a specific study, which may be grouped into a specific category (Polonsky and Walker, 2011:230; Ngcamu, 2011:139).

The frequency or number of responses for each biographical variable such as age in Table 6.1 refers to the number of respondents in a particular age group. Table 6.1 below shows the age group of the respondents and frequency of the respondents in that age category.

Table 6.1 Age group from lowest to highest

Age Group	Frequency
Below 20	2
20-29	5
30-39	10
40-49	22
50-59	9
60 and over	4

(Source: Researcher's own interpretation)

For example, in the age group 20-29, there were 5 respondents, and therefore the frequency in that specific category is 5, while in the age group 40-49, the frequency is 22. However, the frequency does not indicate the percentage of the total number of respondents and for this reason, frequency alone is not enough to make realistic statements about the finding. Thus, it is also important to convert the frequency to a percentage.

Table 6.2 Age group of respondents showing frequency and the percentage

Age group	Frequency	% of Responses
40-49	22	34.37%
30-39	10	26.56%
50-59	9	15.62%
20-29	5	14.06%
60 and over	4	6.25%
Below 20	2	3.12%
Total number of respondents	**64**	**100%**

(Source: Researcher's own interpretation)

Table 6.2 has been rearranged from the highest to lowest frequency and from the highest to the lowest responses. For easy reference, the total number of respondents is 64 representing 100% and the frequency of all the respondents have been converted to a percentage as indicated by Table 6.2.

Furthermore, Polonsky and Walker (2011:230), refer to percentages as the number of parts, per hundred of the same responses, or occurrences. As indicated in Table 6.2, 22 of the 64 respondents for a specific age (40–49 years) variable comprise 34,37%. Similarly, 14% or 4 of the 29 respondents were Afrikaans speaking. In addition, 2,5%

of the 40 respondents (only one respondent) was qualified up to a Masters' Degree in Business Management (Polonsky and Walker, 2011:230).

6.3.1.2 Elements of quantitative research:

There are many elements that make quantitative data easier to analyse and understand, some of which are mean, mode, median, range, frequency and variance amongst others.

Table 6.3 presents the elements such as mean, median, mode, range, frequency and variance to analyse quantitative data.

Table 6.3: Definition of various elements of quantitative research

% of Responses	**64 =100% of the responses (using Table 6.3 above)**
Mean Age (if we take the upper limit in each	Add the maximum age in each group: 49 + 39 + 59 + 29 + 60 + 20 = 256/6. Mean Age is 42.66.
Frequency	There are 22 officials employed in the 40–49 age group.
Median	When the age distribution is recorded from the highest to lowest, the middle point is the median. However, if there are even responses the two middle responses are divided to get the median as indicated in Table 6.2, which shows that 59 + 29 divided by 2. Therefore, the median is 44 years.
Range	The highest frequency minus the lowest: 22–2. Range is 20 years.
Mode	The category (age group) that recurs the most is the mode. Sometimes two or categories may occur the most then this becomes the mode. In Table 6.2, the age group 40–49 occurs the most (22 times) and so the mode is the 40–49 age group.
Frequency	The number of responses in each age category. Frequency for 40 to 49 is 22 and frequency for over 60 is 4.
Variance	The age group of most of the respondents are between 40 to 49 years.

(Source: Researcher's own interpretation)

The concepts presented in Table 6.3 are further discussed as follows:

- **Mean.** Mean refers to the average of all the responses of the sample. To calculate the mean, add all the responses and divide the total by the number of respondents.

- **Media.** To calculate the median number, the first step is to record the results in order and the middle number is the median. If the number or results are odd, then the middle number is the median. However, when there are even number of results, add the two middle number and divide by two to get the median.
- **Mode.** Mode refers to the response (Value) that occurs most often in the responses. If all responses occur only once there is no mode, but if two responses occur most often then both of them are the mode (Anon. Available: www.owlcation.com. Accessed 08 June 2017).
- **Range.** Range refers to the difference between the highest and the lowest score in a normal distribution. Supposing the highest score is 75 and the lowest is 25, (75 minus 25 = 50) A simple subtraction will give you the range, which in this case is 50.
- **Variance.** If the range is the difference between the highest score and the lowest score, variance refers to the distribution of most of the scores. If the scores are at the lower end it could mean that most respondents performed poorly or if on the other hand it is at the higher level, then it could be safely assumed that most performed very well. Variance refers to the spread of the data and the extent to which the responses on average differ from the mean. If the variance is small, it means that the behaviour of the respondents is similar, however a bigger variance means that the behaviour is diverse (Polonsky and Walker, 2011:230).

6.4 DATA PRESENTATION AND FINDINGS: QUANTITATIVE

The following discussion outlines the findings of the structured questionnaire, which is divided into three sections: Section 1 covers the Biographical Information; Section 2 provides information on the functioning of Disaster Risk Management in the Free State Province, and Section 3 focuses on compliance with Disaster Risk Management legislation.

6.4.1 Section 1: Biographical information

Table 6.4 shows the biographical information such as age, population group, language spoken and level of qualification of the respondents.

Table 6.4 Biographical information of respondents (N=29)

Variable		Frequency	Percentage (%)
Population Group	African	18	62
	Coloured	8	28
	White	3	10
	Total	**29**	**100**
Language	Afrikaans	4	14
	English	22	76
	Sesotho	1	3
	IsiXhosa	2	7
	Total	**29**	**100**
Age Group	30-39	6	21
	40-49	16	55
	50-59	6	21
	60+	1	3
	Total	**29**	**100**
Highest level of education	Certificate	17	58
	Diploma	4	14
	Degree	4	14
	Honours or equivalent	4	14
	Total	**29**	**100**

(Source: Researcher's own interpretation)

Table 6.4 above shows the biographical information of the respondents. The modes (highest frequency) are highlighted in blue.

6.4.1.1 Findings and interpretation of biographical information

- Population Group: Question one of the biographical section, was answered by 29 of the respondents, 18 were African, which constitutes 62%, as reflected in Table 6.5. The purpose of this question was to establish which race group is represented by the Disaster Risk Management officials at middle management level, in the Free State Province.
- Language: In the language aspect of the biographical section, the respondent's main languages were Afrikaans, English, Sesotho and IsiXhosa and 76% were English speakers compared to 3% of Sesotho respondents.
- Age Group: Most officials were in the 40–49 age group representing 55% including 21% in the 50–59 age group and 3% in the 60-year age group. The

aim of this question was to establish the age group of the middle management officials of the Disaster Risk Management officials in the Free State Province.

- Highest level of education: The purpose of this question was to establish the qualification level of the respondents. Fifty-eight percent had a certificate in Disaster Risk Management, whilst 48% had diploma and higher qualification.
- Employed at Management or Operational Level – Figure 6.1. In this question, the respondents were requested to indicate whether they were employed at a management level or at an operational level. Figure 6.1 below is a bar chart showing 79% of the respondents were involved at operational level, 68% at strategic level and 66% of the respondents were members of the Joint Operation Centre (JOC).

Furthermore, question 6.4.1 sought to determine the profile of Disaster Risk Management officials in the Free State Province and to establish whether there is sufficient Disaster Risk

Management capacity to render effective Disaster Risk Management services in the Free State Province. If was found that the majority of the officials are classified as Africans between the ages of 40 – 49 (55%), English speaking and educated up to a certificate level in Disaster Risk Management. Seventy-nine percent of the respondent's function at an operational level and a further 68% function at strategic level. In addition, 66% of the respondents are members of the Joint Operation Centre. Only 3% of the officials had over 16 years of experience, whilst most of them had between 1–5 years of experience. From the above discussion, it may be argued that a large majority (48%) of respondents who function at a strategic level have very little experience (3–5 years) to carry out Disaster Risk Management services effectively in the Free State Province.

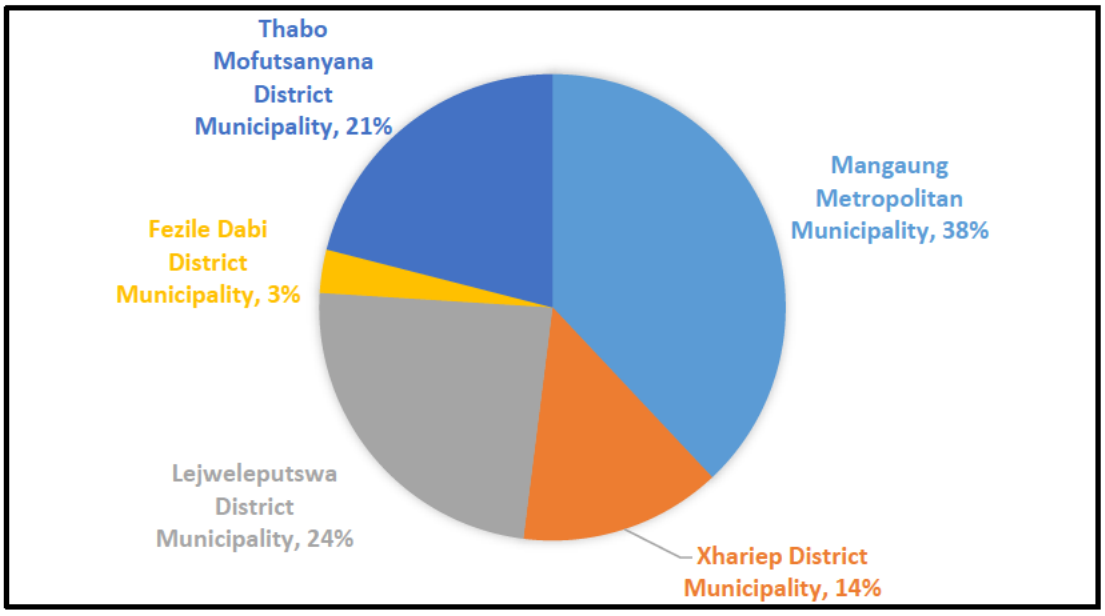
6.4.2 Section 2: Functioning of Disaster Risk Management in the Free State Province

This section required the respondents to express their opinion of how effective the Free State Disaster Risk Management services are. This section also requires respondents to indicate whether they are employed in the Free State District Disaster Risk Management Centre or at the Mangaung Metropolitan Disaster Risk

Management Centre. Furthermore, respondents were also required to express their view of the functioning of the Free State Disaster Management Forums and the Disaster Management Frameworks with which they are involved.

6.4.2.1 Respondents employed at the Free State District Disaster Risk Management Centre or at the Mangaung Metropolitan Disaster Management Centre.

Figure 6.1 Indication whether Disaster Risk Management respondents are from the District or Mangaung Metropolitan Municipality



(Source: Researcher's own interpretation)

Figure 6.1 requires the respondents to indicate whether they are employed at one of the Free State District Disaster Management Centre or at the Mangaung Metropolitan Disaster Management Centre.

Figure 6.1 shows that 38% of the respondents are employed at the Mangaung Metropolitan Disaster Management Centre whilst 24% of respondents are employed at the Lejweleputswa District Disaster Management Centre. In addition, 21% of the respondents are employed at the Thabo Mofutsanyana District Disaster Management Centre, 14% at the Xhariep District Disaster Management Centre and only 3% of the respondents were from the Fezile Dabi District Disaster Management Centre. Figure 6.1 also indicates that most of the respondents are from the Mangaung Metropolitan Municipality Disaster Management Centre and the Lejweleputswa District Disaster Management Centre.

Figure 6.1 also indicates a very low (3%) response rate from the Fezile Dabi District Disaster Management Centre. The majority of the officials from the Fezile Dabi District Disaster Management Centre did not want to participate in the empirical study, therefore only 3%, as indicated in Figure 6.1 above, participated. No apparent reason was forwarded by majority of the Disaster Risk Management officials of the Fezile Dabi District for their non-participation.

6.4.2.2 Rating of the Disaster Risk Management Services Provided by the Free State Provincial, Metropolitan, District and Local Disaster Risk Management Centre

Table 6.5 below, reflects how the Disaster Risk Management officials of the Free State Province rate the various Disaster Risk Management Centres, namely the Provincial, Metropolitan, District and Local Disaster Risk Management Centres are functioning.

Table 6.5 Disaster Risk Management services ratings by the provincial, metropolitan, district and local Disaster Risk Management centres in the Free State Province

Provincial respondents										
	Don't Know		**Very Poor**		**Poor**		**Good**		**Very Good**	
Provincial Disaster Risk Management centre	4	22%	0	0%	1	6%	12	67%	1	6%
Metropolitan Disaster Risk Management centre	7	50%	1	7%	1	7%	5	36%	0	0%
District Disaster Risk Management centre	2	11%	1	6%	2	11%	12	67%	1	6%
Local Disaster Risk Management centre	2	14%	4	29%	3	21%	5	36%	0	0%
Metropolitan respondents										
	Don't Know		**Very Poor**		**Poor**		**Good**		**Very Good**	
Provincial Disaster Risk Management centre	2	29%	0	0%	1	14%	4	57%	0	0%
Metropolitan Disaster Risk Management centre	1	17%	1	17%	1	17%	3	50%	0	0%
District Disaster Risk Management centre	1	20%	1	20%	1	20%	2	40%	0	0%
Local Disaster Risk Management centre	1	20%	2	40%	1	20%	1	20%	0	0%

District respondents										
	Don't Know		Very Poor		Poor		Good		Very Good	
Provincial Disaster Risk Management centre	2	18%	0	0%	0	0%	8	73%	1	9%
Metropolitan Disaster Risk Management centre	6	75%	0	0%	0	0%	2	25%	0	0%
District Disaster Risk Management centre	1	8%	0	0%	1	8%	10	77%	1	8%
Local Disaster Risk Management centre	1	11%	2	22%	2	22%	4	44%	0	0%

(Source: Researcher's own interpretation) Note: Modes are highlighted in blue.

Table 6.5 above shows that of all the provincial respondents, 67% rated the province as well as the district functioning as good and 50% did not know how well the Mangaung Metropolitan Municipality was functioning. In contrast, 57% of the metropolitan respondents rated the Free State Province functioning at 50% (good) and 57% regarded the province as functioning well. The 73% of the district respondents, rate the functioning of the province at 73% and 75% of the district respondents stated that they did not know how well the Metropolitan Municipality functioned.

6.4.2.3 Rate the functioning of Disaster Risk Management frameworks in the Free State Province

Table 6.6 below expresses of how well the Provincial Disaster Risk Management Frameworks in the Free State Province are functioning.

Table 6.6 Participants' opinions of Frameworks

Provincial Respondents										
	No Opinion		**Very Poor**		**Poor**		**Good**		**Very Good**	
Provincial Disaster Risk Management framework	5	29%	1	6%	1	6%	9	53%	1	6%
Metropolitan Disaster Risk Management framework	7	50%	1	7%	1	7%	5	36%	0	0%
District Disaster Risk Management framework	3	18%	2	12%	2	12%	10	59%	0	0%
Metropolitan respondents										
	No Opinion		**Very Poor**		**Poor**		**Good**		**Very Good**	
Provincial Disaster Risk Management framework	1	17%	0	0%	1	17%	4	67%	0	0%
Metropolitan Disaster Risk Management framework	1	17%	1	17%	1	17%	3	50%	0	0%
District Disaster Risk Management framework	1	20%	1	20%	0	0%	3	60%	0	0%
District respondents										
	No Opinion		**Very Poor**		**Poor**		**Good**		**Very Good**	
Provincial Disaster Risk Management framework	4	36%	1	9%	0	0%	5	46%	1	9%
Metropolitan Disaster Risk Management framework	6	75%	0	0%	0	0%	2	25%	0	0%
District Disaster Risk Management Framework	2	17%	1	8%	2	17%	7	58%	0	0%

(Source: Researcher's own interpretation) Note: Modes are highlighted in blue.

Table 6.6 above shows that a total of 53% the provincial respondents are of the opinion that the Provincial Disaster Management Frameworks are good, while only 6% indicated poor and another 6% said poor. Twenty-nine percent of the provincial respondents indicated have no opinion about the Provincial Disaster Management Frameworks, which is a concern. In contrast, 50% of the metropolitan respondents were of the opinion that the Metropolitan Disaster Management Frameworks were good, while 17% of the respondents were of the opinion that it was poor. Another 17% of the respondents were of the opinion that it was very poor, while another 17% had

no opinion. 58% of the district respondents were of the opinion that the District Disaster Risk Management Frameworks were good, while 17% were of the opinion that it was poor, while only 8% said very poor and 17% of the district respondents had no opinion.

In Chapter 2 of this study, it is highlighted that each of the provinces in South Africa must, according to Chapter 4 of the DMA (2002) (Part 1: Provincial Disaster Management Framework) develop a Disaster Risk Management Framework (PDRMF) for their respective provinces. It is further emphasised that the Provincial Disaster Management Framework is a link between the National Disaster Risk Management Centre and the District Disaster Risk Management Centre in South Africa. Therefore, the importance of the framework cannot be discounted, since it is the overarching controlling body for Disaster Risk Management in a province. In addition, Chapter 2 further emphasises that the DMA (2002) also provides that every metropolitan and district municipality is required to establish a Disaster Risk Management Framework. It further emphasises that the Disaster Risk Management Framework of a province must be used as a guide when metropolitan and district municipalities develop their individual frameworks. Therefore, one could argue that it is a concern if 36% of the district metropolitan respondents have no opinion about the Provincial Disaster Risk Management Framework because they should use the Provincial Framework to guide their own District Disaster Risk Management Framework.

6.4.2.4 Rate the functioning of Disaster Risk Management Forums in the Free State Province

Table 6.7 below provides a summary of the views presented by the respondents indicating the functioning of the various Disaster Risk Management Forums in the Free State Province.

Table 6.7 Respondents' assessment of Provincial, Metropolitan and District Advisory Forums

Provincial Respondents										
	Don't Know		Very Poor		Poor		Good		Very Good	
Provincial Disaster Risk Management Advisory Forum	3	17%	1	6%	3	17%	10	56%	1	6%
Metropolitan Disaster Risk Management Advisory Forum	8	57%	2	14%	1	7%	3	21%	0	0%
District Disaster Risk Management Framework*	3	18%	2	12%	6	35%	6	35%	0	0%
Metropolitan Respondents										
	Don't Know		Very Poor		Poor		Good		Very Good	
Provincial Disaster Risk Management Advisory Forum	1	17%	0	0%	2	33%	3	50%	0	0%
Metropolitan Disaster Risk Management Advisory Forum	2	40%	1	20%	1	20%	1	20%	0	0%
District Disaster Risk Management Framework*	2	33%	1	17%	2	33%	1	17%	0	0%
District Respondents										
	Don't Know		Very Poor		Poor		Good		Very Good	
Provincial Disaster Risk Management Advisory Forum	2	17%	1	8%	1	8%	7	58%	1	8%
Metropolitan Disaster Risk Management Advisory Forum	6	67%	1	11%	0	0%	2	22%	0	0%
District Disaster Risk Management Framework	1	9%	1	9%	4	36%	5	46%	0	0%

(Source: Researcher's own interpretation) Note: Modes are highlighted in blue. *These items have two modes

Table 6.7 above shows that 56% of the provincial respondents indicated that the Provincial Disaster Management Advisory Forum (PDMAF) functioned well and only 6% said it functioned very well. Therefore, the majority of the respondents rated the PDMAF as good and very good. Seventeen percent of the provincial respondents indicated that it functioned poor, while only 6% indicated that the PDMAF functioned very poor. 17% of the respondents did not know. The latter is a concern; therefore, one could argue that these respondents are uninformed about the performance of the PDMAF, or even aware that such a forum exists. While 20% of the metropolitan

respondents indicated that the Metropolitan Disaster Management Advisory Forum (MDMAF) functioned well, another 20% of the respondents replied that the MDMAF functioned poor, while another 20% of the respondents replied that it functioned very poor. Forty percent of the respondents did not know how the MDMAF functioned.

6.4.2.5 Section 2: Findings and interpretation of the functioning of Disaster Risk Management in the Free State Province

The majority of the respondents did not know how the MDMAF functioned. A possible reason for this is that the majority of the metropolitan respondents are not informed about the MDMAF performance. In contrast, with the findings of the metropolitan respondents, 46% of the district respondents rated the District Disaster Management Advisory Forum (DDMAF) as good, while 36% of the respondents indicated that its functioning was poor, while only 9% of the district respondents indicated that they did not know. It is clear that the majority of the district respondents rated the DDMAF as good.

Chapter 2 of this study emphasises that the DMA (2002) requires that there must be Provincial Disaster Management Advisory Forum (PDMAF) in each province and that it functions within the ambit of the Provincial Disaster Management Centre. Therefore, it is a concern that 17% of the provincial respondents are unaware how well the PDMAF functions. Chapter 2 further states that although the DMA (2002) does not make provision for the local municipalities (district and metropolitan municipalities) to establish a forum or an institutional and/or interdepartmental governing structure, one has to take into account that local municipality is at the forefront of the institutions that provide Disaster Risk Management Services to any community.

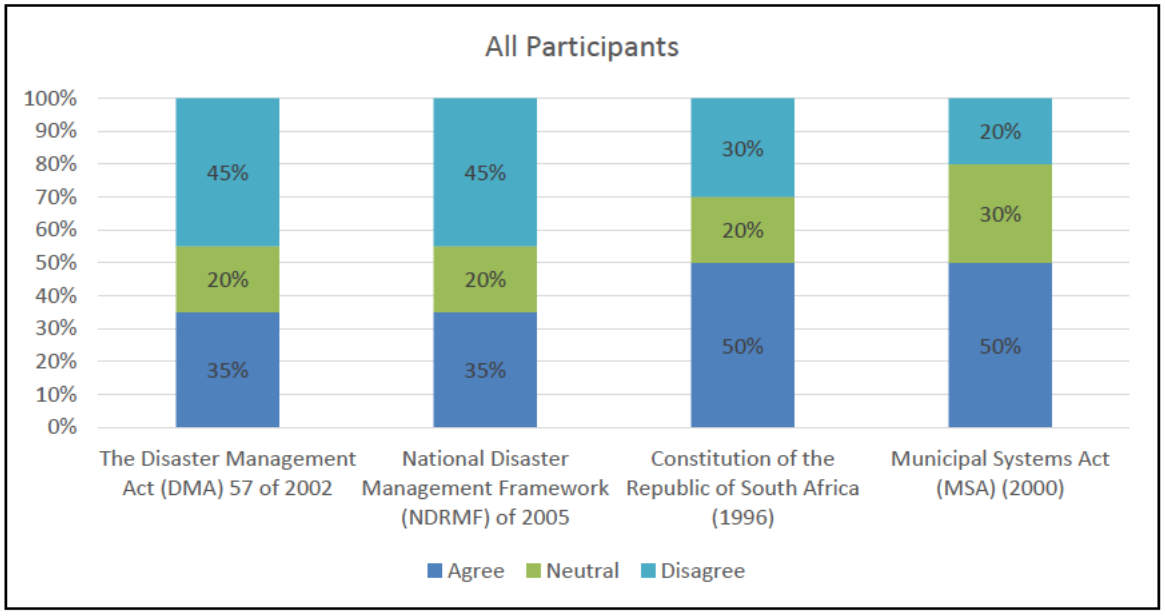
As discussed in Chapter 2 of this study, the National Disaster Management Forum (2005:34-35), maintains that metropolitan and district municipality have to use their discretionary powers to form a forum such as a Municipal Disaster Management Advisory Forum (MDMAF) since it is not prescribed by the DMA, 2002. Therefore, one could argue that it is a concern that 40% of the metropolitan respondents indicated that they did not know how well the MDMAF performed is a concern. One could argue that they are uninformed or even unaware of the existence of such a forum.

6.4.3. Section 3: Compliance with Disaster Risk Management Legislation

6.4.3.1 Free State Provincial Disaster Risk Management centre

Figure 6.2 showing what percentage of employees that are in agreement with the Free State Provincial Disaster Risk Management Centres compliance with the four main legislations as indicated in Figure 6.2 below.

Figure 6.2 Percentage of employees in agreement with DRM legislative requirements



(Source: Researcher's own interpretation)

As can be seen from Figure 6.2 above, 45% disagreed that the Provincial Disaster Management Centre complied with the requirements of the DMA (2002) and the NDM (2005). Only 35% of the respondents agreed that the Provincial Disaster Management Centre complied with the requirements of the DMA (2002) and the NDMF (2005). Only 20% of the respondents were neutral. One could argue that the respondents who remained neutral were not sure are they were not aware of the prescripts of the above act and framework.

The mere fact that 35% of the respondents indicated that the Provincial Disaster Management Centre did not comply with the prescripts of the DMA (2002) and the NDMF (2005) is a concern. Chapter 2 of this study emphasises that Section 29 and Section 43 of the DMA (2002) provides for each sphere of government to fulfil its disaster management responsibilities by establishing Disaster Management Centres.

In addition, Chapter 2 of this study provides that the DMA (2002) places a statutory responsibility concerning Disaster Risk Management and risk reduction on every organ of state in each of the three spheres of government and it gives the mandate for the establishment of Disaster Risk Management Centres in all three spheres of government. Therefore, one could argue that the Provincial Disaster Management Centre should comply with the prescripts of both the DMA (2002) and the NDMF (2005).

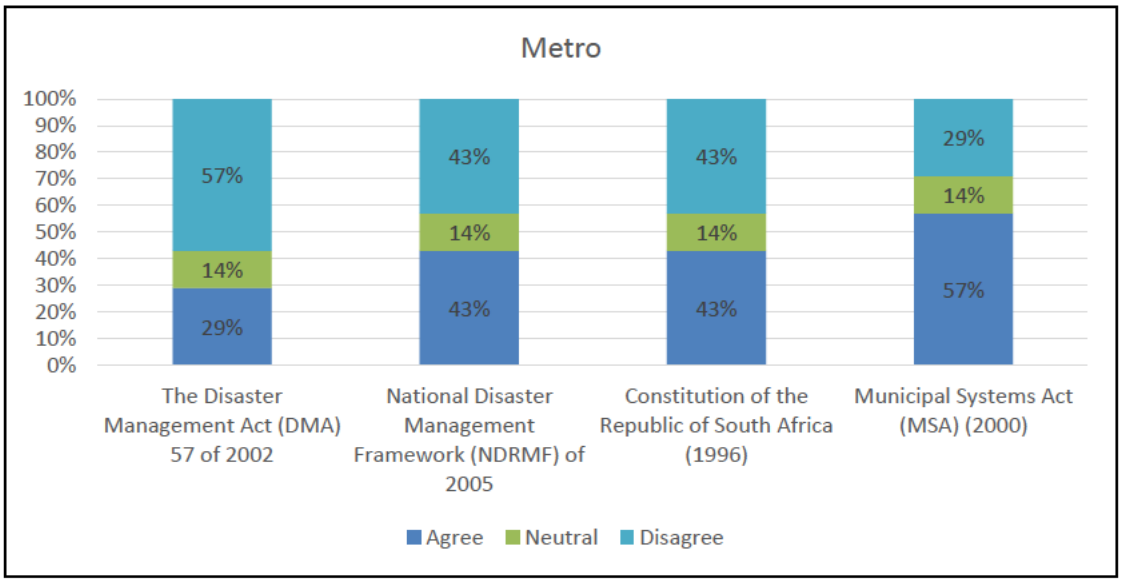
Figure 6.2 above further indicates that majority of the respondents (50%) agreed that the Provincial Disaster Management Centre complied with the requirements of the Constitution, 1996 while 30% disagreed and 20% were neutral. In Chapter 2.6.1 of this study, it states that in terms of Part A, Schedule 4 of the *Constitution, 1996*, Disaster Risk Management is one of the concurrent functional areas of national and provincial legislative competence. Furthermore, it is mentioned in Chapter 2.6.1 that the national and provincial governments are legally obliged to ensure that Disaster Risk Management is implemented according to the legislative requirements as required in terms of the Schedule 4 of the *Constitution, 1996*. One could argue that there is no doubt that all Disaster Management Centres, including the Provincial Disaster Management Centre of the Free State Province must adhere to the prescripts of the *Constitution, 1996*.

Lastly, Figure 6.2 above illustrates that the majority of the respondents agrees that the PDMC should be aware of the prescripts of the MSA (2000). One could argue for the purpose of this study that the PDMC has to monitor the performance of the Metropolitan Disaster Management Centre and the District Disaster Management Centre's within the Province and therefore, the officials of the PDMC should be familiar with the prescripts of the MSA (2000).

6.4.3.2 Metropolitan Disaster Risk Management Centre

Figure 6.3 below indicates the Metropolitan Disaster Risk Management Centre's compliance with four important DRM legislation, the *Constitution, 1996*, MSA (2000), DMA (2002) and the NDMF (2005).

Figure 6.3 The Metropolitan Disaster Risk Management Centre's compliance with DRM legislation



(Source: Researcher's own interpretation)

As depicted in Figure 6.3 above, the majority of the respondents (57%) agreed that the Mangaung Metropolitan Disaster Risk Management Centre complied with the prescripts of the MSA (2000), while 29% disagreed and only 14% were neutral. One could argue that the respondents who remained neutral were not sure are they were not aware of the prescripts of the above act. The majority of the respondents agreed that the Mangaung Metropolitan Disaster Risk Management Centre complied with the prescripts of the *Constitution*, *1996* and the NDMF (2005). Only 14% of the respondents were neutral and 43% disagreed. One could argue that these respondents are not familiar with the performance of the Mangaung Metropolitan Disaster Risk Management Centre or that they were not familiar with the prescripts of the above DMA (2002) and the NDMF (2005).

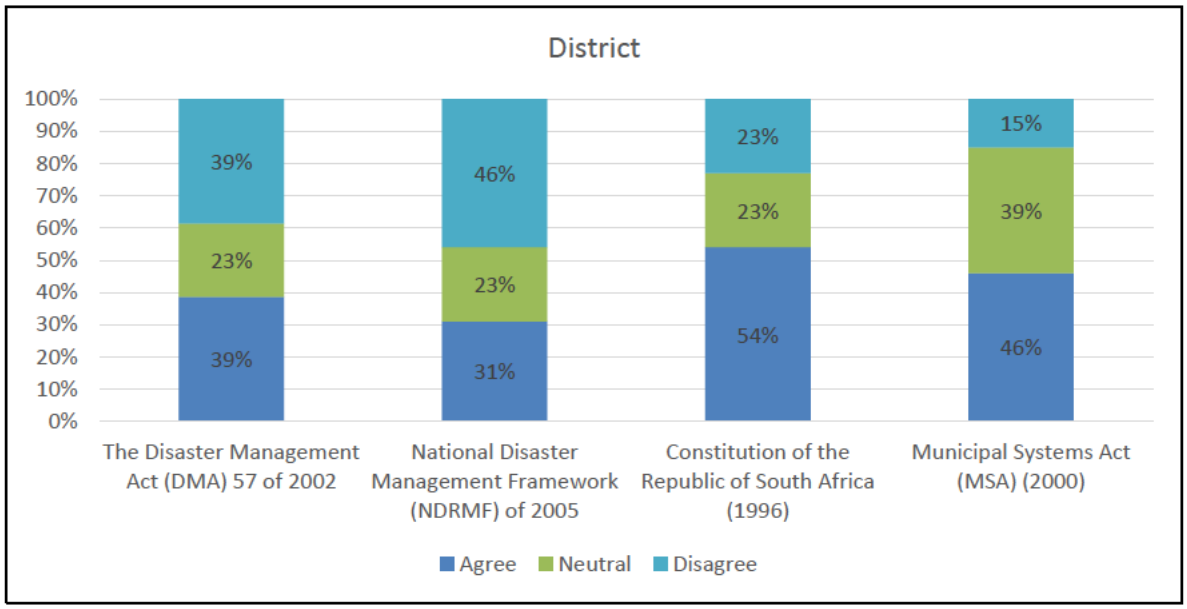
It is a noticeable is that the majority of the respondents (57%) disagreed that the Mangaung Metropolitan Disaster Risk Management Centre complied with the requirements of the DMA (2002), while only 14% of the respondents were neutral and 29% agreed that it complied with the DMA (2002). As indicated above, it is a concern that the majority of the respondents disagreed that the Mangaung Metropolitan Disaster Risk Management Centre complied with the requirements of the DMA (2002).

Chapter 2 of this study clearly emphasises that Section 29 and Section 43 of the DMA (2002) provide that each sphere of government have a role to fulfil concerning disaster management in that national, provincial and local spheres have to establish Disaster Management Centres. Chapter 2.6.2 further explains that, in terms of the DMA (2002), the purpose of these centres is to promote an integrated and coordinated system of Disaster Risk Management, with specific emphasis on prevention and mitigation of Disaster Risk Management in South Africa. One could argue that the Mangaung Metropolitan Disaster Risk Management Centre has to comply with the prescripts of the DMA (2002).

6.4.3.3 District Disaster Risk Management Centre

Figure 6.4 below reflects the District Disaster Risk Management Centre's compliance with *Constitution,* 1996, The MSA (2000), the DMA (2002) and the NDMF (2005).

Figure 6.4 The District Risk Management Centre's compliance with the significant DRM legislation



(Source: Researcher's own interpretation)

As shown in Figure 6.4 above, the majority of the district respondents (54%) agreed that the various Free State District Disaster Risk Management Centres were compliant with the prescripts of the *Constitution, 1996*, while 23% disagreed and 23% were neutral. One could argue that the respondents who disagreed and those that remained

neutral were either not sure or were not aware of the prescripts of *Constitution, 1996* regarding Disaster Risk Management.

In addition, 39% of the respondents agreed and 39% of the respondents disagreed that the Free State District Disaster Risk Management Centres complied with the prescripts of the DMA (2002). Only 22% of the respondents expressed no view on whether the Free State District Disaster Risk Management Centres complied with the prescripts of the DMA (2002).

However, the majority (46%) of the respondents disagreed that the Free State District Disaster Management Centres complied with the prescripts of the NDMF (2005). Thirty-one percent of the respondents agreed that the Free State District Disaster Management Centres complied with the prescripts of the NDMF (2005) and 23% remained neutral. One could argue that these respondents were not familiar with the performance of the Free State District Disaster Risk Management Centres or that they were not familiar with the prescripts of the NDMF (2005).

Figure 6.4 above further shows that the majority of the respondents (46%) agreed that the Free State District Disaster Risk Management Centre complied with the requirements of the MSA (2000), while 39% of the respondents were neutral and 15% disagreed that it complied with the MSA (2000). One may argue that these respondents were either not familiar with the performance of the Free State District Disaster Risk Management Centres or were not familiar with the prescripts of the above the MSA (2000).

Chapter 2 of this study clearly emphasises that according to DPLG (2008:6), the DMA (2002) places a statutory responsibility concerning Disaster Risk Management and risk reduction on every organ of state in each of the three spheres of government and it gives the mandate for the establishment of Disaster Risk Management Centres in all three spheres of government.

Furthermore, under emergence of Disaster Risk Management Reforms in South Africa, Section 42 of the DMA (2002) provides that each district and metropolitan municipality must establish a Municipal Disaster Management Framework and a Disaster Management Centre. In Chapter 2 of this study under Emergence of Disaster

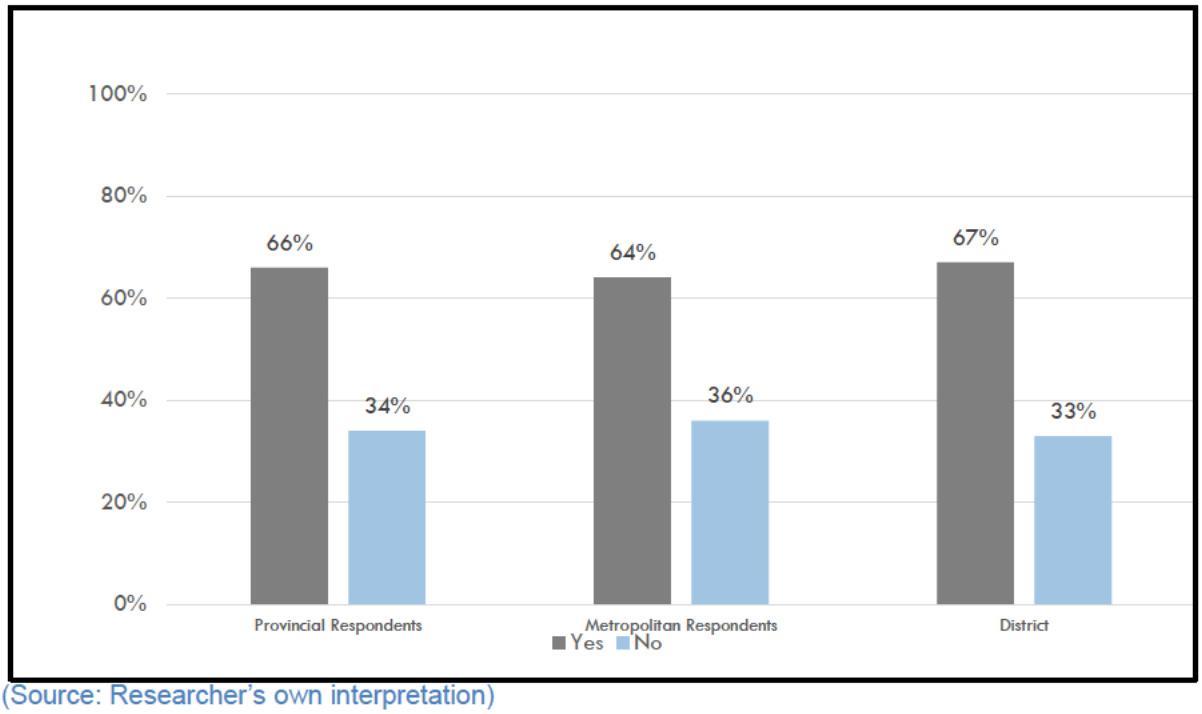
Risk Management Reforms in South Africa, Botha and Van Niekerk (2013:2) argue in line with the DMA (2002) and the NDMF (2005) that the implementation of Disaster Risk Management is the responsibility of the metropolitan and district municipalities.

Therefore, one could argue that the Free State District Disaster Risk Management Centres has to comply with the prescripts of *Constitution, 1996*, the DMA (2002), the NDMF (2005) and the MSA (2000).

6.4.3.4 Recommending a Disaster Risk Management model

Figure 6.5 below is a bar graph, which requires respondents to indicate whether there is need for a model to be developed to facilitate the better understand of Disaster Risk Management Services in the Free State Province.

Figure 6.5 Percentage of respondents that recommend a model to understand Disaster Risk Management better



(Source: Researcher's own interpretation)

Figure 6.5 above shows that 66% of the Provincial Respondents agreed that there was a need for a model, whilst 34% of the Provincial respondents disagreed that a Disaster Risk Management Model was necessary. 64% of the Metropolitan respondents agreed that there was a need for a model, whilst 36% of the Metropolitan respondents disagreed that there was a need for a Disaster Risk Management Model.

In addition, 67% of the district respondents agreed that there was a need for a model, whilst only 33% of the district respondents disagreed that there was a need for a Disaster Risk Management model to be introduced to their municipalities.

Figure 6.5 above clearly shows that majority of the respondents from the DRM Centres of the provincial, metropolitan and the district municipalities within the Free State Province agreed that a DRM model should assist officials to understand DRM better. Only 34% of the provincial respondents, 36% of the metropolitan respondents and 33% of the district respondents said no. One could argue that these respondents were not familiar with the benefits of DRM models in general and the manner in which such a DRM model could assist them to understand DRM within their DRM Centres better.

Chapter 4 emphasises that a well-designed DRM model will make it easier to develop and implement strategic policy decisions. Moreover, Pine (2015:60) stresses the importance of understanding how DRM models function so that the purposes for which they were designed are successfully met. One of the main purposes of the proposed DRM model is to avert large-scale social and economic losses.

Furthermore, Chapter 4 (Kelly, 1998:25) advocates that a DRM model can assist to understand complex activities by differentiating between critical elements such as preparedness and mitigation measures on the one hand, and response and recovery on the other. Thus, usefulness of critical elements of a model, the understanding of critical concepts and purposes of models becomes more apparent.

Therefore, one could argue for the purpose of this study that these respondents are not familiar with the benefits of models in general and the manner in which such models could assist them to understand Disaster Risk Management functioning at the various Disaster Risk Management Centres better in the Free State Province.

6.5 FINDINGS AND INTERPRETATION OF QUANTITATIVE DATA (SECTION 1–3)

The summary of the quantitative data has been summarised according to three categories: Biographical Information of the Disaster Risk Management respondents of the Free State Province, Functioning of Disaster Risk Management in the Free State

Province and Compliance with Disaster Risk Management Legislation by the disaster risk Management officials of the Free State Province.

6.5.1 Biographical information – Section 1 (Table 6.5)

The summary of the Biographical Information is provided in Table 6.5 and is outlined below. Question 1 of the biographical section was answered by 29 of the respondents; 18 were African, which constitutes 62% reflected in Table 6.1. The purpose of this question was to establish which race group is represented by the Disaster Risk Management officials at middle management level in the Free State Province.

In the language aspect of the biographical section, the respondents' main languages were Afrikaans, English, Sesotho and IsiXhosa and 76% were English speakers, compared to 3% of Sesotho respondents. Most officials were in the 40–49 age group, representing 55% including 21% in the 50–59 age group and 3% in the 60-year age group. The aim of this question was to establish the age group of the middle management officials of the Disaster Risk Management officials in the Free State Province. The purpose of this question was to establish the qualification level of the respondents. Fifty-eight percent had a certificate in Disaster Risk Management, whilst 48% had diploma and higher qualification. This is sufficient regarding the level of qualification required to function at a strategic level in Disaster Risk Management.

Most of the officials were classified as Africans between the ages of 40–49 (55%), English speaking, educated up to a certificate level in Disaster Risk Management and involved. In addition, 79% of these officials were involved at operational, 68% at strategic level with 48% having between 1–5 years of experience and 41% with 6–10 years' experience. From this discussion, one may argue that a large majority (41%) of the respondents have sufficient number of years' experience and the required level of Qualification experience (NQF Level 6 of higher). However, what is unclear is whether the qualifications of these officials are related to Disaster Risk Management.

6.5.2 Functioning of Disaster Risk Management in the Free State Province – Section 2 (Figure 6.3 and Tables 6.6–6.8)

In the Free State Province, 38% of the respondents are employed at the Mangaung Metropolitan Disaster Management Centre; 24% of respondents are employed at the Lejweleputswa District Disaster Management Centre; 21% of the respondents are employed at the Thabo Mofutsanyana District Disaster Management Centre; 14% at the Xhariep District Disaster Management Centre; and only 3% of the respondents were from the Fezile Dabi District Disaster Management Centre.

The findings indicate that of the four districts in the Free State Province, the Lejweleputswa District Disaster Management Centre had the highest (24%) responses and only 3% of respondents were from the Fezile Dabi District Disaster Management Centre.

In addition, the findings indicate that 67% of all the provincial respondents, 57% of the Mangaung Metropolitan respondents and 73% of the district respondents indicated the Provincial Disaster Management Centre as functioning good. The findings also show that 36% of all the provincial respondents, 50% of the Mangaung Metropolitan respondents and 25% of the district respondents indicated that the Mangaung Metropolitan Disaster Management Centre functioned well. The Free State District Disaster Management Centres are rated as good follows: 67% of the provincial respondents, 40% of the Mangaung Metropolitan respondents and 77% of the district respondents.

The functioning of the Provincial Disaster Management Framework is rated as good by 57% of Provincial Disaster Management respondents, 67% of the Mangaung Metropolitan respondents and 46% of the district respondents. The functioning of the Mangaung Metropolitan Disaster Management Framework is rated as good by 36% of Provincial Disaster Management respondents, 50% Mangaung Metropolitan respondents and 58% of the district respondents.

The functioning of the Free State District Disaster Management Framework is rated as good by 46% of the Provincial Disaster Management respondents, 25% of the Mangaung Metropolitan respondents and 58% of the District respondents. The

functioning of the Provincial Disaster Management Advisory Forum is rated as good by 56% of Provincial Disaster Management respondents, 50% of the Mangaung Metropolitan respondents and 58% of the district respondents.

The functioning of the Mangaung Metropolitan Disaster Management Advisory Forum is rated as good by 21% of Provincial Disaster Management respondents, 50% of the Mangaung Metropolitan respondents and 22% of the district respondents. The functioning of the Free State District Disaster Management Advisory Forum is rated as good by 35% of Provincial Disaster Management respondents, 20% of the Mangaung Metropolitan respondents and 46% of the district respondents.

6.5.3 Compliance with Disaster Risk Management Legislation in The Free State Province – Section 3 (Figure 6.2– 6.7)

To establish the compliance level of the Free State Province with Disaster Risk Management Legislation in the Free State Province, respondents were first put into three groups. The first group of officials were from the Mangaung Metropolitan Disaster Management Centre, the second group was from the Free State District Disaster Management Centres, and the third group (all respondents) were officials from the Metropolitan Districts as well as the Free State Provincial Disaster Management Centre.

The findings show that 43% of the Mangaung Metropolitan Municipality respondents agreed that the Free State Provincial Disaster Management complied with the *Constitution*, *1996*, and 57% complied with the MSA (2000). However only 29% of the Mangaung Metropolitan Municipality respondents agreed that the Free State Provincial Disaster Management Centre complied with the DMA (2002) and 43% with the NDMF (2005).

The findings show that 45% of the respondents disagreed that the Provincial Disaster Management Centre complied with the requirements of the DMA (2002) and the NDMF (2005).

Only 35% of the respondents agreed that the Provincial Disaster Management Centre complied with the requirements of the DMA (2002), and the NDMF (2005) and only

20% of the respondents were neutral. One could argue that the respondents who remained neutral were not sure and not aware of the prescripts of the above act and framework. The mere fact that 35% of the respondents indicated that the Provincial Disaster Management Centre did not comply with the prescripts of the DMA (2002) and the NDMF (2005) is a concern. In Chapter 2.6.2 of this study it was emphasised that Section 29 and Section 43 of the DMA (2002) provide for each sphere of government to play a role in disaster management and that national, provincial and local spheres have to establish Disaster Management Centres. In addition, Chapter 2 of this study states that the DMA (2002) places a statutory responsibility concerning Disaster Risk Management and risk reduction on every organ of state in each of the three spheres of government. It also provides the mandate for the establishment of Disaster Risk Management Centres in all three spheres of government. Therefore, one could argue that the Provincial Disaster Management Centre should comply with the prescripts of both the DMA (2002) and the NDMF (2005).

Figure 6.2 above further indicates that majority of the respondents (50%) agreed that the Provincial Disaster Management Centre complied with the requirements of the *Constitution* (1996), while 30% disagreed and 20% were neutral. In Chapter 2.6.1 of this study, it is stated that in terms of Part A, Schedule 4 of the *Constitution, 1996*, Disaster Risk Management is one of the concurrent functional areas of national and provincial governments. Furthermore, it is mentioned in Chapter 2 that the national and provincial governments are legally obligated to ensure that Disaster Risk Management is implemented according to the legislative requirements in terms of the Schedule 4 of the *Constitution, 1996*. One could argue that there is no doubt that all Disaster Management Centres, including the Provincial Disaster Management Centre of the Free State Province must adhere to the prescripts of the *Constitution, 1996*.

Lastly, Figure 6.2 above illustrates that the majority of the respondents agrees that the Provincial Disaster Management Centre should be aware of the prescripts of the MSA (2000). One could argue for the purpose of this study that the Provincial Disaster Management Centre has to monitor the performance of the Metropolitan Disaster Management Centre and the District Disaster Management Centres within the Province; therefore, the officials of the Provincial Disaster Management Centre should be familiar with the prescripts of the MSA (2000).

The findings show that 54% of the Free State District Municipalities respondents agreed that the Free State Provincial Disaster Management Centre complies with the *Constitution, 1996*, and 46% comply with the MSA (2002). However, only 39% of the Free State District Municipalities respondents agreed that the Free State Provincial complied with the DMA (2002) and 31% stated that the Disaster Management Centre complied with the NDMF (2005).

The conclusion drawn from the findings is that only 50% of the provincial respondents indicated that the Free State Provincial Disaster Risk Management Centre complied with the prescripts of the DMA (2002) and the MSA (2000). In addition, 29% of the Metropolitan Disaster Management respondents indicated that the Free State Provincial Disaster Management Centre complied with the DMA (2002) and 43% with the NDMF (2005). However, of the Free State District Disaster Management respondents, 39% with the DMA (2002) and 31% indicated that the Free State Provincial Disaster Management Centre complied with the NDMF (2005). Therefore, the discussion clearly shows that there is a large degree of non-compliance by the Provincial, Metropolitan and District municipalities in implementing the DMA (2002) and the NDMF (2005).

The findings indicate that in compliance with the *Constitution, 1996*, the DMA (2002) and the NDMF (2005) range between 35% and 57% by the provincial, metropolitan and district municipalities in the Free State Province.

Regarding staffing, 60% of the metro respondents, 44% of the provincial respondents and 39% of the districts respondents agreed that there was sufficient staff capacity in their institutions to render effective Disaster Risk Management services. Between 64% and 67% of the provincial, metropolitan and District Disaster Management Centre respondents agreed that a model would assist Disaster Risk Management officials to understand the functioning of Disaster Risk Management better.

From the above discussion, one could argue that for the purpose of this study, it is the responsibility of the NDMC to support the Provincial Disaster Management Centre to monitor the application of the various disaster management related legislation namely the *Constitution, 1996*, MSA (2000), the DMA (2002) and the NDMF (2005).

The findings also show that 50% of all the respondents agreed that the Free State Provincial Disaster Management complied with the *Constitution, 1996*), and the MSA (2000). However only 35% of all the respondents agreed that the Free State Provincial Disaster Management Centre complied with the DMA (2002) and the NDMF (2005). One can deduct from the above that a large group of respondents was of the opinion that there was a significant level of non-compliance with the *Constitution, 1996*, and the MSA (2000), DMA (2002) and the NDMF (2005).

6.6 QUALITATIVE DATA ANALYSIS

In this section, the findings and analysis of data obtained from the semi-structured interviews and group interviews with Disaster Risk Management officials are presented. Thus, for the purposes of this study, 22 semi-structured interviews using open-ended questions were conducted, the details of which are discussed in detail in Chapter 5.

6.6.1 Inferential statistics of qualitative data

Anderson (2010:74) argues that qualitative data try to explore, understand and interpret the meaningfulness and symbolic meanings of the content, which are audio recordings and/or oral communications. Furthermore, qualitative data investigate questions and models and go beyond the responses for instance, inferential statistics is used to understand how a community thinks or feels; in other words, make judgements from the data by describing what is going on in the data. This is revealed in Table 6.9 (Anderson, 2010:74).

In addition, a thematic analysis was used in this research to pinpoint and record patterns or themes. Similar questions were presented for the quantitative as well as for the qualitative approach and the responses were compared for purposes of triangulation. The percentage of the responses in the quantitative data was compared to the thematic responses of the qualitative data. The quantitative responses correlate with the findings of the qualitative responses and therefore triangulation was achieved (Anderson, 2010:74).

6.6.1.1 Qualitative Data Analysis Framework

In this study as discussed above, Anderson (2010:74) argues that qualitative data analysis requires three vital aspects for rigour. Firstly, there must be a detailed account of the techniques and methods used to select samples and generate data, secondly careful attention must be paid to issues of validity and reliability and thirdly there must be triangulation with other data collection methods (Anderson, 2010:74).

A dictaphone, which is a digital recording device, was used to capture the responses of the interviewees during semi-structured interviews. This information was then transcribed verbatim in a table format using a computer. To ensure the accuracy of this process, some of the interviewees were requested to review the transcription to ensure accuracy. In some instances, interviewees were phoned to clarify uncertainties and in other cases, further meetings were held to revise the inconsistencies (Anderson, 2010:74).

The qualitative data analysis process included three important aspects, namely an in-depth discussion/description of the techniques and methods that were used to select the samples from whom the data were generated. Furthermore, the qualitative approach concerned itself with studying phenomena from a closer and deeper perspective, with respondents that formed a relatively small group directly involved in the management of disaster risks. Hence, semi-structured interviews with open-ended questions were used in this study, the purpose of which was to collect thick and rich data, which included recording human behaviour and feelings to describe the phenomena in detail. Whilst most of the verbal responses were recorded electronically, the behaviour and feelings of respondents were manually recorded as field notes (Welman *et al.,* 2005:20).

6.6.2 Semi-structured interviews

For the purposes of this study, 22 semi-structured interviews using open-ended questions were conducted. The respondents as provided in Chapter 1 and in Chapter 5.7 of this study represented the South African National Disaster Risk Management Centre, The CoCT Metropolitan Municipality, from the Western Cape Province, the Ekurhuleni Metropolitan Municipality from the Gauteng Province and the Mangaung

Metropolitan Municipality from the Free State. In addition, interviews were also conducted with a sample from the Free State Province, the Provincial Disaster Management Centre, the Metropolitan Municipality, and the Fezile Dabi, Lejweleputswa, and Xhariep District Municipality, eight provincial departments, one parastatal and one nongovernmental organisation. The sample may be further broken down as follows:

- Two focus group interviews were held with the Free State Provincial Disaster Risk Management Advisory Forum.
- One face-to-face interview was held with a senior Provincial Disaster Risk Management official.
- Three focus group interviews were held with the Free State Disaster Risk Management Advisory Forum representing the Lejweleputswa, Xhariep and Fezile Dabi Disaster Risk Management Centres.

In total, 10 focus-group interviews with institutions and organisations in the Free State were conducted as represented below:

- Fire Protection Unit at Dewetsdorp (3 members)
- SAPS Free State (3 members)
- Free State Provincial Joint Operation Centre (3 members)
- FS Department of Social Development (4 members)
- FS ESKOM (2 members)
- FS Department of Agriculture (4 members)
- FS Group 1 – Department of Rural Development and Land Affairs (3 members)
- FS Group 2 – Department of Rural Development and Land Affairs (3 members)
- FS Public Works, Roads and Transport (2 members)
- FS South African Weather Service (2 members)

Telephonic appointments were initially made, for all interviews, which was later followed by a written request. The written permission explained ethical considerations, such as anonymity, confidentiality and the freedom to stop during any time of the interview. Apart from one district, Fezile Dabi District, no difficulties were encountered in obtaining permission and all officials contacted from the various institutions for this

purpose welcomed the research process. Although one of the Disaster Risk Management coordinators of the Fezile Dabi District requested that her team is not willing to respond without prior permission from the municipals manager, two members from this district were supportive and participated in the research process.

6.6.3 Qualitative data from the structured questionnaire

The respondents were requested to state their views on the Functioning of Disaster Risk Management Frameworks in the Free State Province. (This question was presented in the semi-structured interview schedule as well as in the structured questionnaire – Question 5.2).

Table 6.8 Responses to how the Disaster Risk Management Frameworks in the Free State Province function

Date	Municipal code	Responses on how the Provincial Disaster Risk Management in the Free State Province functions	Coding/Units of meaning
03/09/2017	21783830	The functionality of the Provincial Disaster Management Centre is centred on the four KPAs of the Provincial Disaster Management Framework; however, the organisational structure is not. There are five district coordinators, who are expected to assist municipalities in performing all KPAs. The structure could improve if all the KPAs could have enough 'warm bodies' to carry out the functions	Staff capacity
03/06/2017	21685555	No comment	N/A
02/28/2017	21596942	We do not have enough staff and funds to make sure that the frameworks are working well.	Staff capacity
02/23/2017	21534217	Risk assessments are done	Identify Risks
02/21/2017	21477063	There is no adequate budget and staff to implement	Staff Capacity and Budget constraints
02/21/2017	21476907	There is no adequate budget for DM in the District	Budget constraints
02/21/2017	21476157	There is not enough manpower to implement and due to budget constraints, no work can be done.	Staff Capacity

02/20/2017	21459984	No comment	
04/18/2017	22562154	The disaster framework that we are currently using is assist to achieve the objectives of the *Disaster Risk Management Act*, thus it is probably very effective and efficient.	Implementation of Disaster Risk Management Framework
04/02/2017	22288585	Our framework tries to address the district challenges and so far, it works.	Implementation of Disaster Risk Management Framework
03/30/2017	22199178	At municipal level, our most important function is to coordinate all-important structures to help the affected community during incidents and disaster occurrence.	Coordination of all Disaster Risk Management activities to help affected communities.
03/20/2017	21962483	Framework that we use. If we follow it correctly it will assist us accordingly	Implementation of Disaster Risk Management Framework
03/17/2017	21938301	No comment	N/A
03/16/2017	21927149	In government environment, reactiveness seldom happens, we are reactive in most cases	Disaster Responses are delayed
03/15/2017	21906530	Needs to be established in all levels.	Provincial Disaster Management Centre must be established
03/14/2017	21887988	No Comment	N/A
03/14/2017	21882622	Framework is Disaster Management Framework and disaster plan of the province.	Provincial Framework in Place
03/14/2017	21882177	Very few including our officials within disaster management fraternity make reference to these documents because they rely on the National one	Provincial Framework in place but rely on National Framework.

(Source: Researcher's own interpretation)

Table 6.8 above and Table 6.9 below are a summary of the responses to how the Disaster Risk Management Frameworks in the Free State Province are functioning. Each of the responses were individually transcribed from the written responses that were in the structured questionnaire.

Table 6.9 below provides a summary of how the Disaster Risk Management Frameworks in the Free State Province function.

Table 6.9 Summary of the Provincial, Metropolitan and District Disaster Management Framework

Date	Municipal code	Responses regarding the functioning of the Provincial, Metropolitan and District Disaster Management Frameworks	Codes/Units of meaning
05/18/2017	23603575 Provincial respondents	It is based on the National Framework. We need to improve on our plan. We need to improve on our Framework. The smaller municipality do not have the capacity for the function of a disaster division. As soon a person gets qualified the person move to a bigger municipality with for a better salary.	Rely on National Framework
05/17/2017	22199178 Metropolitan respondents	Our Framework is very good. It is following the national and province. The Framework is not implemented because we have staff challenges. The framework is good because everyone was used to develop the framework.	Framework is good. Staff capacity
05/10/2017	23388900 District respondents	District Framework is addressing the challenge of local municipalities. District framework is not functioning. District framework is addressing the entire district possible hazard. It is based on the provinces Framework Disaster Management Framework is the same as the national framework.	District Framework not functioning
05/04/2017	23269914 Local municipal respondents	The framework is normally national standard and is not elaborating more in related to Local Municipalities on which there is more challenges. Disaster management in the Naledi Local Municipality is not respected at all. We work with Provincial Framework as there are no local or district Framework	Disaster Management in Naledi Local Municipality is not respected at all.

(Source: Researcher's own interpretation)

6.6.3.1 Summary of findings and interpretations

As can be seen from Table 6.8 and 6.9 the actual date, the specific municipal respondent and the responses were transcribed to support the summary of how the Disaster Risk Management Frameworks in the Free State Province function. The code

number is a specific number, which may only be identified by the researcher if there is need for any clarification of the responses. The code also states whether the respondent is a functionary of the Disaster Risk Management at Provincial, District or Local municipal sphere.

The following challenges were identified from the responses as indicated in Table 6.8 and Table 6.9 on how the Disaster Risk Management Frameworks in the Free State Province function. There is a shortage of staff to implement KRAs; a shortage of funds to implement the DRM frameworks, which is a concern; and an inadequate budget and skilled staff to implement DRM frameworks, specifically at district municipalities. Another concern raised by respondents is that the government does not act proactively but rather reactively in the case of major incidents or disasters. Another negative aspect reflected in the above tables is that the disaster management fraternity does not refer their own provincial, metro, or district frameworks, but rather rely on the National Disaster Risk Management Framework.

Positive aspects identified from Table 6.8 and Table 6.9 include the following:

- the DRM frameworks comply with the prescripts of the DMA (2002);
- other respondents mentioned that the District Disaster Risk Management Frameworks aim to address Disaster Risk Management challenges within the specific district;
- another highlighted response is that at municipal (metropolitan and district municipality) it is a priority to coordinate all-important Disaster Risk Management activities to assist the affected communities during incidents or disasters in an effective manner.

As provided in Chapter 1 Chapter 2 and in Chapter 3 of this study, the Free State Provincial Disaster Risk Management Centre does not function effectively for the following reasons, namely lack of funding, lack of an effective communication system and lack of sufficient skilled personnel.

Chapter 2 of this study clearly states that in terms of the Schedule 4 of the *Constitution, 1996* and in accordance with the DMA (2002), as mentioned above, local governments

should not be exempted from Disaster Risk Management if specific municipalities have the capacity to manage disaster risks.

Furthermore, Chapter 2 in clearly states that the DMA (2002) places a statutory responsibility concerning Disaster Risk Management and risk reduction including the establishment of Disaster Risk Management Centres on every organ of state in each of the three spheres of government.

From the above challenges as depicted in Table 6.8 and Table 6.9 one could argue that the DMA (2002) places a legal responsibility on provincial, metropolitan and district DRM Centres to have the capacity (funds and staff members) to manage DRM effectively.

The rest of the discussion of the qualitative responses emphasises the main themes and sub themes which includes the challenges and strengths as emphasised by the respondents. As reflected in Table 6.9 above, the respondents provided reasons such as lack of funding, staff and skills shortages in response to how the frameworks in the province were functioning.

According to the 2017 Free State Provincial Disaster Management Centres Quarterly Report, the Provincial Disaster Management Centre does not function as expected for reasons such as lack of funding, lack of skilled personnel and an ineffective communication system. In this regard, Section 29 and Section 43 of the DMA (2002) make provision for the national, provincial and local spheres of government to provide effective Disaster Risk Management services.

However, the findings in Chapter 6 of this study indicate that 45% disagreed that the Provincial Disaster Management Centre complied with the requirements of the DMA (2002) and the NDMF (2005). Only 35% of the respondents agreed that the Provincial Disaster Management Centre complied with the requirements of the DMA (2002), and the NDMF (2005), while only 20% of the respondents were neutral.

In addition, Chapter 6 indicates that the majority of the respondents (50%) agreed that the Provincial Disaster Management Centre complied with the requirements of the *Constitution*, *1996*, while 30% disagreed and 20% were neutral. In Chapter 2.6.1 of

this study, it is stated that in terms of Part A, Schedule 4 of the *Constitution*, *1996*, DRM is one of the concurrent functional areas of national and provincial legislative competence. Furthermore, it is mentioned in Chapter 2.6.1 that the national and provincial governments are legally obliged to ensure that DRM be implemented according to Schedule 4 of the *Constitution*, *1996*. One could argue that there is no doubt that all Disaster Management Centres, including the Provincial Disaster Management Centre of the Free State Province, are found wanting regarding the implementation of the *Constitution,* 1996), the DMA (2002) and the NDMF (2005).

For these reasons, 67% of the district respondents agreed whilst only 33% disagreed that there was a need for a Disaster Risk Management model to be introduced to their municipalities, which, if used effectively, would assist in ensuring that there was a common understanding of Disaster Risk Management in the Free State Province.

6.7 DATA PRESENTATION AND FINDINGS FROM THE FOCUS GROUP INTERVIEW

The following presentation outlines the findings of the semi-structured questionnaire. Questions were presented to the focus groups and their responses were recorded in a voice-recording device (dictaphone). Field notes were also made of the behaviour and feelings of the respondents. The recordings were then transcribed by an expert statistician. The first question required respondents to differentiate between Disaster management and Disaster Risk Management.

6.7.1 The Difference between Disaster Management and Disaster Risk Management

Table 6.10 provides the responses for the difference between Disaster Risk Management (DRM) and Disaster Management (DM).

Table 6.10 The difference between Disaster Risk Management (DRM) and Disaster Management (DM)

Difference between Disaster Risk Management (DRM) and Disaster Management (DM)?				
Themes	**Sub-theme**	**Concepts**	**Transcription from interview**	**Code /Elements identified**
Disaster Risk Management (DRM)	More emphasis on risk reduction	*"DM is basically the same as DRM, while the latter emphasising on the reduction of disaster risk."* *"Basically the same. DRM put more emphasis on Risk reduction."* *"Basically, the same. DRM put more focus on Risk Reduction."* *"Anticipating and reducing risk is DRM."* *"Disaster Risk Management is to mitigate any risk in disaster management."*		Disaster Risk Management and Disaster Management is the same. Disaster Risk Management emphasises risk reduction. Disaster Risk Management is using scientific methods to assess disaster risks.
	Scientific method for disasters	"Disaster Risk Management *using scientific methods for disasters."*		
	Managing disasters. Mostly referring to management of disasters before they occur (sub-Theme)	"Disaster Risk Management *encompasses all the aspects of managing a disaster (pre-disaster, during the disaster and post-disaster). The Disaster Management Act and Amendment Act Mention Disaster Management and not* Disaster Risk Management*, but still define disaster management in terms of managing disasters before they happen (risk reduction - prevention, mitigation & preparedness) and attending to disasters when they do occur (response and recovery)."*		Disaster Risk Management includes pre and post disaster activities. Disaster Risk Management includes all aspects of disaster management.

		"Disaster Risk Management refers to reducing and managing conditions of hazard, exposure and vulnerability that we can prevent losses and alleviate the impacts of disasters. Since we cannot reduce the severity of natural hazards, the main opportunity for reducing risk lies in reducing vulnerability and exposure. This is done through Prevention, Mitigation, Transfer and Preparedness." *"DRM is when you manage the risk that might occur."* *"DRM is about managing possible risk"*	DRM is managing possible future risks.
	Prevention	*"DRM (preventative)."* *"The first one is prevention."* *"Risk is more proactive."*	Disaster Risk Management involves Prevention
	Identifies potential risks	*"DRM identifies potential risks that may cause a disaster."* *"DRM you must know the possible hazards in the area* *Risk Management is when dealing / identify the risk and mapping of the risk."* *"DRM actually deals or identified risk that impose danger and measures that can be taken to minimize it."* *"DRM is the most probable and likely risk."*	Disaster Risk Management Hazard Analysis must be conducted DRM is risk identification and risk mapping.

		"Risk Management is when dealing / identify the risk and mapping of the risk."	
	Assessing risk after disaster has occurred	"Disaster Risk Management *entails the assessing of a risk after it has occurred"*	DRM is Risk Assessment after the disaster
	DRM is multisectoral and Multidimensional	"Disaster Risk Management*' refers to integrated, multisectoral and multidisciplinary administrative, Organisational, and operational planning processes and capacities aimed at lessening the impacts of natural hazards and related environmental, technological and biological disasters."*	Disaster Risk Management is multisectoral and Multidimensional
Disaster Management (DM)	Use of own resources to deal with disasters	*"Disaster management using own resources in dealing with hazards."* *"Disaster management is a multidisciplinary approach using own resources."*	Disaster Management (DM) Disaster Management is using own resources.
	Management of disaster situation Mostly refers to management of disasters after they occur.	*"DM indicates how to manage a disaster situation."* *"DM (manage what happened)."* *"DM is damage caused by natural hazards."* *"DM is the actual disaster to be managed."* *"DM you are just responding when there is a Disaster situation."*	Disaster Management is managing a disaster after it has occurred.

		"Disaster Management is to manage the disaster and come with preventative measure / awareness." *"The second is manage what have happened."* *"While DM deals with them at all including DRM and mostly with the aftermath of incidents as measures of assistance."* *"DM is the process of managing disaster already in place."* *"DM you are managing the current situations."* *"Management is reactive,"* *"Whereas the disaster management is the act of ensuring the control of a disaster."* *"Disaster Management is a collective term encompassing all aspects of planning for and responding to disasters including both pre-and post-disaster activities namely, prevention, mitigation, preparedness, response, recovery and rehabilitation, it may further refer to the management of both the risk and consequences of disasters."* *"Disaster Management is to manage the disaster and come with preventative measure/awareness."*	Disaster Management is responding to a disaster Disaster Management includes Disaster Risk Management Disaster management is reactive Disaster Management is the control of a disaster. Disaster Management is the same as Disaster Risk Management.
	Preparation for possible disaster	*"Disaster management is to coordinate or be ready for any man made/natural disaster that may occur,*	Both DRM and DM is the planning and preparation for a

		according to me there is no big different."	disaster. They are the same.
Disaster Risk Management and Disaster Management are the same	Managing risks and vulnerabilities of an area	*"They both resemble the same concept of managing the risks and the vulnerabilities in a particular area or environment."* *"Used interchangeably, same meaning."*	Disaster Management and Disaster Risk Management refer to the management of disasters.
Other: different concepts	Development of Disaster Risk Management system to address disaster risks	*"A* Disaster Risk Management *is the systematic development and application of policies and strategies to reduce disaster risks"* *"DRM is the practice to minimize vulnerabilities"* *"Disaster risk reduction is an integral and important part of disaster management".* *"Disaster Management is the management of disasters when a disaster occurs such as emergency management and civil protection services."* *Disaster Management is the management of disasters after they occur*	Development of Disaster Risk Management systems to address disaster risks. Development of policies to manage disasters

(Source: Researcher's own interpretation)

6.7.1.1 Findings and interpretation

In describing the difference between Disaster Risk Management (DRM) and Disaster Management (DM), four themes were identified, namely Disaster Risk Management, Disaster Management, Disaster Risk and Disaster Management and Other. The theme Other refers to Disaster Risk Management and Disaster Management as having different approaches in the management of disasters. Disaster-Risk Management

comprises six sub-themes, and is considered as the management of disasters from before they occur, whilst Disaster Management comprises four sub-themes, referring to the management of disasters after they have occurred.

The mixture of responses, for example, that Disaster Management and Disaster Risk Management as a concept are the same, disaster management is the management of a disaster after it has occurred and that Disaster Risk Management is the holistic approach to Disaster Risk Management. These responses are an indication that there is a need to clarify these concepts. In addition, respondents have stated that concepts such as risk assessment, mitigation, prevention and preparedness must be done before a disaster occurs with no clarity in order or sequence. One may argue that there must be a common understanding of the concepts, Disaster Management and Disaster Risk Management for effective DRM services before any other concepts are understood.

According to Vermaak and Van Niekerk (2004:558), the increasing number of disasters necessitates an approach that moves beyond pure “disaster management” that would include Disaster Risk Management and disaster risk reduction (Chapter 1.2.2). These approaches would include the assessment of risk before developing mitigation and prevention strategies. Furthermore, Coburn *et al.* (in Van der Waldt *et al.,* 2007:257) argue that Disaster Risk Management refers to all aspects of planning, and responding to disaster activities pre and post the actual event. Disaster Management refers to a very narrow concept of managing disasters, while Disaster Risk Management is a systemic approach to managing pre-disaster activities, during disaster activities as well as post-disaster activities. For this reason, the preferred international Disaster Risk Management concept is strongly suggested by the Sendai Framework (2015) and this study for a common understanding and uniform approach to Disaster Risk Management.

6.7.2 The functioning of the Disaster Risk Management Framework within the Free State Province

The Disaster Risk Management Framework referred to here is the DRM Framework for the Free State Province, Mangaung Metropolitan Municipality and the Free State District Frameworks.

Table 6.11 below provides a summary of the findings of the functioning of the Disaster Risk Management Framework with which respondents are involved.

Table 6.11 The functioning of the Disaster Risk Management Frameworks in the Free State Province

Describe the functioning of the Disaster Risk Management Framework with which you are involved		**Codes/Meaning units**
Theme	**Quotes from respondents**	
No adequate budget	*"There is not enough manpower to implement and due to budget constraints, no work can be done."* *"There is no adequate budget for DM in the District."* *"There is no adequate budget and staff to implement."*	Lack of capacity to implement the Framework (Funding and Personnel)
Lack of staff to implement (Manpower)	*"There is not enough manpower to implement and due to budget constraints, no work can be done."* *"There is no adequate budget and staff to implement."* *"The smaller municipality do not have the capacity for the function of a disaster division. As soon a person gets qualified the person move to a bigger municipality with or a better salary."*	Inadequate funding a skilled personnel
Room for improvement	*"The functionality of the Provincial Disaster Management Centre is centred on the four KPAs of the Provincial Disaster Management Framework; however, the Organisational structure is not. There are five district coordinators, who are expected to assist municipalities in performing all KPAs. The structure could improve if all the KPAs could have enough 'warm bodies' to carry out the functions."*	Lack of capacity (five coordinators to support 19 local municipalities).

Framework needs to be established on all levels	*"Needs to be established in all levels."*	Framework not establish as per legislation
Government reactive	*"In government environment, reactiveness seldom happens; we are reactive in most cases."*	Responses to disaster are reactive
Framework effective and efficient	*"The disaster framework that we are currently using is assist to achieve the objectives of the* Disaster Risk Management *Act, so I think that it is very effective and efficient."*	Disaster management Framework is very effective.
DM not respected	*"Disaster management in Naledi Local Municipality is not respected at all."*	Disaster Risk Management in Naledi Municipality is ineffective.
District framework addressing challenges This includes helping affected communities (Not concepts but subthemes)	*"Our framework is trying to address the district challenges and so far is working."* *"At municipal level our most important function is to coordinate all important structures to help the affected community during incidents and disaster occurrence."* *"District framework is addressing the entire district possible hazard."* *"District Framework is addressing the challenge of locals."*	District Framework is effective and being used for municipalities.
Communication	*"There's always a room for improvement. E-mails and SMSs might not be a quicker way of distributing information."* *"There is still gap for improvement."* *"NGOs improvement, particularly for rural areas."*	Communication system could be improved
Framework is productive	*"The framework is productive by that the strategies that are put on the table are discussed and some are implemented some are adjusted to provide the best outcomes."*	Framework is effectively used for decision-making.
Prevention and continuous risk	*"Prevention and continuous risk assessment are emphasized given the impact disaster from the organisation can create/have. There is a*	Framework allows for continuous assessment of the plans.

assessment emphasised	*division with several departments dealing with different aspects."*	
Support to farmers Communication equipment Not themes but concepts	*"Support very necessary to farmers and rural communities to give timely and ample support." Some of the equipment are two-way radios and firefighting equipment.*	Farmers were supported given firefighting equipment and two-way radios for effective communication.
Assisting in improving risk management systems	*"Public sector risk management framework is assisting a lot in terms of improving risk management services."*	Public Sector Risk Management Framework is used effectively
Very informative	*"Very much informative."*	
Other	*"Risk assessments are done."* *"Very few including our officials within disaster management fraternity make reference to these documents because they rely on the National one."* *"Framework is disaster management framework and disaster plan of the province."* *"Framework that we use if we follow it correctly it will assist us accordingly."* *"The framework is normally national standard and is not elaborating more in related to Local Municipalities in which there are more challenges"* *"Minor events; medium events; natural disasters, acid rain, fire, road disasters, major accident."*	National Framework is being used since the district framework is not in place. The district is using the Provincial Framework. District Framework based on the National framework does not cater for local municipality specific hazards.

(Source: Researcher's own interpretation)

6.7.2.1 Findings and interpretation

The main theme is that the District Disaster Management Framework addresses challenges to provide Disaster Risk Management Services to all municipalities in the district. The District Disaster Management Framework is also involved in assisting local municipalities by coordinating all Disaster Risk Management activities in a

specific district. The main findings show that although the District Disaster Management Framework assists in improving Disaster Risk Management services, there is room for improvement in the way real time information is disseminated especially with rapid onset disasters.

However, Table 6.10 also indicates that districts use the Provincial DMF, as well as the NDMF (2005) as a basis for their planning, which is against the legislative mandate. One may argue that these respondents are unaware of the requirements of the NDMF (2005:6), which states that that each province, metropolitan municipality as well as district municipality must develop their individual Disaster Management Framework, which is a guiding instrument for the development of Disaster Risk Management Plans. The reason for this arrangement is that not all municipalities are confronted by the same hazards.

For this reason, Chapter 2 of this study discusses that the NDMF (2005) was designed to assist municipalities to develop their own coherent, transparent and inclusive policies and plans on Disaster Risk Management in South Africa. This framework, must serves as a guiding tool for effective Disaster Risk Management, focuses on the establishment of an integrated institutional capacity, a uniform approach to assessing and monitoring disaster risks, all role-players develop and implement integrated Disaster Risk Management plans according to approved legislation and the implementation of an effective, integrated and coordinated rapid response, recovery and rehabilitation plans. Therefore, each province and each district must in terms of the DMA (2002) and the NDMF (2005) must develop a framework, which must be used as a guiding tool in the development of Disaster Risk Management plans.

Chapter 3 (Table 3.5) indicates that Disaster Management Framework has not been established in all spheres of government in the Free State Province (provincial, metropolitan and district). However, some of the main challenges identified in the Free State Province include inadequate budget, lack of skilled staff and lack of political will and support. Some of the positive findings where frameworks have been developed are that the Frameworks are effective and they are assisting in improvement of Disaster Risk Management as a service delivery imperative. Therefore, one may argue that the Disaster Risk Management Framework is an important guiding blueprint that municipalities may use in the development of their Disaster Risk Management plans.

The next section portrays the implementation of the DMA (2002).

6.7.3 The functioning of the Disaster Management Act, (2002) In The Free State Municipalities

Table 6.12 below provides a summary of the findings of how the DMA (2002) is functioning in the Free State Province.

Table 6.12 *Functioning of* the *Disaster Management Act (57 of 2002)* in the Free State Province

What challenges does your institution experience with regard to the implementation of The *Disaster Management Act (DMA) 57 of 2002*.			
Theme	**Concepts**	**Quotes from respondents**	**Codes/Meaning units**
Lack of clarity on role in municipality	*"Lack of clarity of role of municipalities."*		Municipal Disaster Risk Management officials unclear of their roles and responsibilities.
No budget (Funding)	*"No budget for DM."* *"There is no budget for DM."* *"Budget."* *"Lack of funding."* *"Budget constraints and resources."* *"I normally make inputs for disaster management budget, the municipality they don't budget for any single thing for disaster, I was told many times that this function is for district now I can't do anything of my function because it is not budged for."* *"Budget constraints that is leading to shortage of personnel and resources in terms of four disaster framework Key Performance Area and Enablers."* *"Insufficient budget, no trainings available for the Disaster Management Officer since the appointment/establishment of the post in 2009."*		Lack of Funding Disaster Management is the responsibility of Districts. Municipalities fail to budget for disaster management. Officials not trained in the implementation of the DMA (2002) and the Framework (2005). Lack of funds to purchase vehicles and equipment No budget Lack of funding from other departments Funding challenges.

	"There is no money. The municipality cannot buy the vehicles and equipment. The people who must implement the Act, bylaws and the equipment is not trained." *"No budget for disaster at all, the managers they don't even recognize disaster anything."* *"Lack of funding from other sectors."* *"Budget."* *"Only budget availability to support disasters where necessary is a challenge."* *"Funding (challenges ensuring required infrastructure is available all time)."* *"Insufficient pre-disaster funding."*	
Lack of staff (Manpower)	*"No staff component."* *"There is no dedicated personnel for DM."* *"Manpower."* *"Lack of support and ownership; staff shortages."* *"Few officials for the entire municipality."* *"Budget constraints that is leading to shortage of personnel and resources in terms of four disaster framework Key Performance Area and Enablers."*	Lack of skills capacity Shortage of skilled personnel. Funding shortage.
Lack of support from management	*"Lack of support and ownership; staff shortages."* *"Lack pro-active measures support."* *"Lack of capacity and support from the management."* *"Lack of support from top management leading to lack of resources and high staff turnover."*	Lack of proper planning Lack of senior management support.

Lack proper communication Including issues with reporting channels and feedback.	*"There is an absolute lack for proper communication hence the result to none compliance with such framework."* *"The Provincial Disaster Management Advisory forum is functional, however, Sector Departments' Managers often delegate the membership to Junior Officials or send different officials to attend meeting without providing them with proper background or briefing them with resolutions of the previous meetings. Functionality of the Provincial Disaster Management Centre (PDMC) in general could improve if reporting channels could be minimised, e.g. reporting directly to the Head of Department: COGTA will ensure prompt response and recovery, and risk reduction programs will be fully supported. The organisational structure should be improved. The Interdepartmental Disaster Management Committee, consisting of political heads does not exist."*	Blurred communication, reporting lines Noncompliance with Framework. Disaster Risk Management in sectoral departments requires support. Lack of political will and support IDMC non-functional Unclear reporting lines IDMC non-existent
Lack of training	*"Knowledge of the requirements of the act at operational level."* *"Lack training of staff."* *"Insufficient budget, no trainings available for the Disaster Management Officer since the appointment/establishment of the post in 2009."* *"The people who must implement the Act, bylaws and the equipment is not trained."* *"Training of councillors and senior management to be able to understand Disaster."*	Lack of knowledge of the DMA (2002) and the Disaster Management Framework of 2005 by DRM officials to implement DRM effectively. Lack of understanding of the requirements of for effective Disaster Risk Management by councillors and senior management.
Involvement of management and departments	*"The involvement and participation of departments."* *"Need management involvement is strongly needed in order to make the plan a success."* *"Cooperation and involvement of all Role plays of department."*	Ineffective involvement of sectoral departments in implementing DRM.

Other	*"Other than disaster policies, any other policy in place in all spheres of government are not correctly monitored and evaluated; simply, there is no much interest from our principals."* *"We have not yet establish Local Disaster Management Advisory Forum, as well as interdepartmental committee."* *"The councillors need to be strongly capacitated in related to DMA and the role of municipality during disaster incidents."* *"The act is very clear on who should do what and when."* *"Having to fulfil the role of DM with regards to warning dissemination."*	Local Disaster Management Advisory Forum not established. Municipal councillors need to be trained in DRM services. Ineffective early warning systems. Ineffective communication mechanisms

(Source: Researcher's own interpretation)

6.7.3.1 Findings and interpretation

Most respondents indicated that the lack of support from senior management, insufficient funding, shortage of skilled staff and ineffective communication systems affected the successful implementation of the DMA (2002). Furthermore, junior officials were often sent to attend Disaster Risk Management meetings on an ad hoc basis that affect consistency in the implementation of Disaster Risk Management policies. In addition, sectoral departments are not supportive of the implementation of the DMA (2002).

Chapter 2 of this study discusses the DMA (2002), which claims in Section 19 (a-f) that each municipality (metropolitan, district and local municipality) must develop a Disaster Risk Management (DRM) plan. In addition, Section 7(2)(e) indicates that a copy of the Disaster Risk Management plan must be submitted to the applicable provincial and national Disaster Risk Management Centres. On receipt of the risk management plans, the Disaster Risk Management Centres may then make recommendations regarding the funding thereof, in line with all relevant municipal legislation.

Furthermore, according to the DPLG (2008:6), the DMA (2002) places a statutory responsibility concerning Disaster Risk Management and risk reduction on every organ of state, in each of the three spheres of government, which also provides the mandate for the establishment of Disaster Risk Management Centres in all three spheres of government. The DMA (2002) also requires cooperation and collaboration from all role-players on the part of national, provincial and local spheres of government, civil society and the private sector (DPLG, 2008:6). Therefore, one may argue that the DRM officials are unaware of the legal requirements for of the DMA (2002) and the NDMF (2005).

In addition, some other challenges include no clear communication and reporting lines, councillors require training in the implementation of the DMA (2002) and the Framework (2005), and the lack of political will and support is a clear indication that Disaster Risk Management as a service delivery imperative is not functioning according to acceptable standards. Section 10 of the *Disaster Management Amendment Act, 2015* makes provision for an extended reporting system by organs of state regarding information about the occurrences that leads to the declaration of disasters, including expenditure that may be incurred regarding mitigation measures and response and recovery initiatives. Therefore, one may argue that there is sufficient legislative support; however, support from politicians and senior management is lacking.

The next aspect deals with the use of a DRM model to understand Disaster Risk Management better.

6.7.4 Recommending an integrated DRM model

Table 6.13 provides a summary of the findings of the responses to recommending a model for understanding Disaster Risk Management better.

Table 6.13 Responses to recommending a model for understanding Disaster Risk Management better

Would you recommend a model to understand Disaster Risk Management in your municipality better?		
Theme	**Quotes from respondents**	**Codes/Meaning units**
Disaster Management Disaster Management not functioning at an appropriate level	*"DM is still not at the level where it is supposed to be in the Municipalities."* *"DM is not at the level where it is supposed to be in the municipality. DM is non-functional."*	Disaster Risk Management is ineffective
	"DM is not fully understood, therefore cannot take its rightful place in the municipality."	DM is not functioning at an acceptable level.
Model recommended: to understand and mitigate hazards better **Subthemes** Can learn from new models for better preparedness **Subtheme** Use models to understand roles and responsibilities	*"Models help you to better understand hazards and to mitigate effects of hazards."* *"To improve the state of* Disaster Risk Management *in the province."* *"We can always learn from best practices and new models for better preparedness."* *Disaster Risk management is being overlooked at municipal level even by Politicians. So it's very important that a model is introduce for all concern to understand their roles and responsibilities."*	Models help to understand Disaster Risk Management better. To improve Disaster Risk Management Models introduce best practices. Models will bring about an understanding of the roles and responsibilities in DRM.
Model not recommended (Subthemes Will not be monitored or funded **Other**	*"No use as it won't be monitored or funded."* *Yes, I am of the opinion that there are better systems to be implemented that is more effective."*	Models if recommended will not be funded nor will it be monitored. There are better systems than models. A model must be introduced by independent officials.

General	*"This would be a document by neutral and independent person done without any ulterior motive."* *"The defence force has its own framework of operations."* *"Workable solution based on the current 3rd world country status."* *"There is very little equipment, vehicles and the maintenance of the equipment is not being done. There is no centre; no radios or medical equipment."* *"To keep it as my librarian for references."* *"Because we are able to respond to all challenges and hazards on time."*	Models will be good if it is suited to local conditions. Models will be good to refer to.
No single model can be used **Subthemes** More research required	*"Yes I am of the opinion that there are better systems to be implemented that is more effective."* *"This would be a document by neutral and independent person done*	*Models are not the best and a document may* *Developed by an independent person for this purpose.*
Subthemes More training required **Subthemes** Learn from other municipalities	*"We must make sure that we educate municipal managers, councillors responsible for safety and disaster, and disaster practitioners at different municipalities must be given proper training and work benefits to can respond to incidents reported speedily."* *"Training of the Disaster Management through various institutions."* *"More training for me and managers to better understand disaster better."*	No single mode is good enough. Municipal managers, councillors and DRM officials must be trained in using a model. Models must be used by different institutions for training purposes.
	"I believe we must learn from other municipalities who are excelling in this subject." *"Copying from other best than ours."*	Models from other institutions may be used for learning purposes.

(Source: Researcher's own interpretation)

6.7.4.1 Findings and interpretation

Table 6.13 provides the findings of the responses to recommending an integrated Disaster Risk Management model for understanding Disaster Risk Management services better. Table 6.13 further indicates that the various concepts of Disaster Management are not fully understood by all the officials in the Free State Province and therefore the Disaster Management Centres are functioning at different levels. In addition, respondents stated that an integrated Disaster Risk Management model would help to understand and improve Disaster Risk Management services better. It will also introduce DRM best practices and bring about a common understanding of the roles and responsibilities of officials in DRM services.

However, respondents agreed that although no single integrated Disaster Risk Management model is good enough, and if one has to be introduced, it must be developed and introduced by independent officials. Furthermore, integrated Disaster Risk Management models that may be used by different institutions for training purposes must be designed to be suited to local conditions to ensure that a common understanding of the tenets of DRM is passed on. A further difficulty some respondents had was that if an integrated Disaster Risk Management model were recommended, it would not be funded or monitored. Some respondents argued that an alternative training manual rather than a Disaster Risk Management model would suffice.

Chapters 2 and 5 of this study discuss that the modelling and simulations functionality provides for the development of a model to simulate various risk scenarios with a view to creating awareness and for the effective allocation of resources. In this way a proposed integrated Disaster Risk Management model was developed to ensure a common understanding (creating awareness) of the various important concepts of DRM and secondly resources may be allocated according to the main components required for effective disaster risk reduction (NDMF, 2005).

For these reasons, one may argue that the introduction of a proposed integrated Disaster Risk Management model will bring about a common understanding of Disaster Risk Management concepts, assign roles and responsibilities to DRM officials for purposes of accountability and thus improve the overall quality of Disaster Risk Management as a service delivery imperative.

The next aspect discusses the challenges experienced by Disaster Risk Management officials in the Free State Province.

6.7.5 Challenges experienced by Disaster Risk Management officials in the Free State Province

Table 6.14 provides a summary of the challenges that Disaster Risk Management officials in the Free State Province are faced with when conducting their day-to-day Disaster Risk Management duties.

Table 6.14 Challenges that Disaster Risk Management officials are faced with in carrying out Disaster Risk Management activities

Challenges experienced by Disaster Risk Management Officials in the Free State Province		
Theme	**Quotes from respondents**	**Codes/Meaning units**
No DM unit in municipality	*"There is no DM Unit in the Municipality …"* *"The Municipality does not have a DM Unit or budget for DM"* *"The municipality does not have DM."*	No DRM Centre/unit Disaster Risk Management is non-functional
DM run by Community Service Manager	*"DM is run by the Community Service Manager. The Municipality rely on the District for DM assistance."* *"The Community Service Manager is tasked with DM matters."*	DRM is managed by Community Service Manager who relies on the District for support.
No DM budget Including no budget to maintain qualified officials.	*"No DM budget."* *"The Municipality does not have a DM Unit or budget for DM…"* *"No budget, I am doing disaster management alone for Dewetsdorp, Wepener, Van Stadensrus and the surroundings farms without any resources, no travelling allowance and cell-phone allowance but people who have this benefit are using municipal vehicles on my side it very*	No Budget. Lack of resources/personnel/finances/equipment Smaller municipalities do not have specialised staff.

	difficult for me to respond to incidents, management they don't take good care for disaster for whatever reasons." *"Financially the smaller municipalities cannot afford specialised and trained people. As mentioned, when people are qualified, they move to bigger companies for better salaries. These specialised jobs must be taken over by government and people must be placed at smaller municipalities."* *"No budget, current disaster official is not recognized in the municipality, I am not informed of any disaster related matter. I am not given a car/cell phone allowance to execute disaster duties."*	No equipment or funding since DRM is not recognised.
Lack of political commitment	*"Lack of political commitment."*	Lack of Political commitment.
More qualified and experienced officials required	*"More qualified and experienced officials are required to execute the functions of* Disaster Risk Management *properly. Disaster Management profession should be taken seriously and Heads of District and Provincial Disaster Management Centres should have enough experience and relevant qualifications."* *"Suitable qualified members with applicable skills, dedication and commitment are required to ensure the proper functioning of disaster management."*	Lack of experienced DRM officials. Senior management must be trained in DRM DRM officials are demotivated.

Lack of resources	*"No budget, I am doing disaster management alone for Dewetsdorp, Wepener, Van Stadensrus and the surroundings farms without any resources, no travelling allowance and cell-phone allowance but people who have this benefits are using municipal vehicles on my site it very difficult for me to respond to incidents, management they don't take good care for disaster for whatever reasons."* *"One Toyota bakkie for veld and structural fire."* *"The main challenge with Setsoto LM does not have adequate resources to can deal with Disaster Management Incidents. Currently only Disaster Coordinator appointed dealing with issues related to Disaster and Fire. Politicians are unable to identify disaster and incidents e.g. single house fire they claim it to be Disaster Incidents."*	No response vehicle Only DRM coordinator appointed Lack of political will and support
DM must be taken seriously	*"Disaster management policies must be taken seriously."* *"If the management can take disaster management serious and allocate necessary resources to the Centre and capacitate the Officer. "*	DRM Policies not implemented effectively.
Other	*"Disaster Management should be viewed as key legal obligation to all institutions, that is, state departments, private and NGOs because the recovery thereof is very expensive and devastating in some cases."*	DRM legal prescripts must be implemented Consequences of ineffective DRM may be too costly. Satellite communications must be implemented.

	"Need to do more emergency drills to evaluate preparedness." *"Space based resources in disaster management."*	

(Source: Researcher's own interpretation)

6.7.5.1 Findings and interpretation

As reflected in Table 6.14 above, the Disaster Risk Management officials in the Free State Province are experiencing challenges in the implementation of Disaster Risk Management activities. The main reason is the lack of scientific and technical DRM expertise, which is essential to conduct Hazard Analysis and Risk Management. Lack of financial resources is having a negative impact on the hiring of skilled staff with the relevant technical expertise. Moreover, there is a lack of emergency service vehicles and communication devices, which are necessary for effective Disaster Risk Management Services. Although these challenges are faced by the larger municipalities, the impact of these challenges is far greater on smaller municipalities that are at the forefront of the onslaught of disasters and still lack resources.

Disaster Risk Management as a service-delivery imperative is not given much priority in the Free State Province. This is reflected in Table 6.14 above, which shows some of the severe DRM challenges experienced in the Free State municipalities such as DRM policies not being implemented effectively because of a critical shortage of skilled staff. In one instance, only the DRM coordinator has been appointed with no other support staff, in another instance, disaster management is run by a Community Service Manager. There is also a lack of political will and support which has resulted in some DRM Centres not been established. For these reasons, one may argue that Senior Managers are unaware of the legal requirements for effective implementation of the DMA (2002) and the NDMF (2005), leading to ineffective DRM services.

Chapter 2 of this study discusses the main purpose of the DMA (2002) as stated in Chapter 3 which is to provide for an integrated and coordinated disaster management policy focusing on the prevention and/or reduction of disaster risks. The IFRC and Red Crescent Societies (2010:26) state that the NDMF (2005) makes provision for an institutional framework for Disaster Risk Management, it further provides a policy and strategic planning framework for Disaster Risk Management, the classification of

disasters, and it makes provision for funding of post-disaster recovery and rehabilitation activities.

Furthermore, the various structures and institutions such as the national, provincial and municipal Disaster Management Centres have been established to provide for a well-coordinated and integrated Disaster Risk Management services. The purpose of these centres is to promote an integrated and coordinated system of Disaster Risk Management, with specific emphasis on prevention and mitigation of Disaster Risk Management in South Africa. Section 42 and 43 of the DMA (2002) provides for each district and metropolitan municipality to establish a Municipal Disaster Management Framework and a Disaster Management Centre.

In addition, according to the DPLG (2008:6), the DMA (2002) places a statutory responsibility concerning Disaster Risk Management and risk reduction on every organ of state in each of the three spheres of government and it gives the mandate for the establishment of Disaster Risk Management Centres in all three spheres of government. The DMA (2002) further requires cooperation and collaboration from all role-players, including from the national, provincial and local municipalities.

According to SALGA (2011:9), Disaster Risk Management is supposed to reside within the Presidency at national sphere, at the premier's department at provincial sphere or within the department of the mayor at local sphere. The reason for this placement is that it should receive the highest level of political support from the sphere of government, in which DRM is situated. Another reason for this location is that Disaster Risk Management is a management function that cuts across all departments and it should not function as an independent department, unit or section (SALGA, 2011:9).

For these reasons, it may be argued that it is mandatory in terms of the legislative prescripts, namely the DMA (2002) and the NDMF (2005), that the Free State municipalities receive sufficient political support to offer adequate Disaster Risk Management Services.

6.7.6 Disaster Risk Management services rendered by the Municipalities in the Free State Province

Table 6.15 provides a summary of the findings that represent Disaster Risk Management services by the various Free State institutions.

Table 6.15 DRM services offered by the municipalities in the Free State Province

Description of the Disaster Risk Management services provided by Free State Municipalities		
Theme	**Quotes from respondents**	**Codes/Meaning units**
All around service	*"Our services are an all-round, were by if there is a disaster in any place or municipality in the Free State we first go and receive first-hand information from that community so that we can provide a proper service that has an impact."*	Disaster Response is very time-consuming and awkward.
Focus on support and prevention to agencies	*"Being a power utility, the focus is more in supporting relevant agencies and preventing occurrences from our operations."* *"Support strategically in the department."*	Support for departments instead of support for communities.
Good	*"Good"*	DRM services in the Free State is good.
Support to farmers	*"Support to farmers on pre and post disaster needs an agriculture related support."*	Support for farmers.
Risk management and advisory services	*"Risk management services at department is providing advisory services …"*	Regarding Risk Management department provides advisory services.
Weather alerts and early warnings	*"Early warnings, advisory alerts services for severe weather."*	Severe weather alert services in place
Preparedness and mitigation	*"We focus mainly on preparedness (capacity building) & mitigation."* *"Preparedness and mitigation."*	Preparedness Planning for capacity building and mitigation always poses challenges.
Challenging	*"It is a very challenging matter due to various influences that are always possible."*	

(Source: Researcher's own interpretation)

6.7.6.1 Findings and interpretation

Table 6.15 it shows that the main services rendered by these institutions are hazard analysis, risk assessment and implementing early warning systems such as weather

alerts and post disaster recovery services. The various municipalities focus on risk management and advisory services to government departments and other institutions. The focus is on preparedness, mitigation and early warning for weather alerts. However, preparedness planning for capacity building and mitigation poses challenges because of financial and staffing constraints

Chapter 3 (Table 4.5) summarises the extent to which the Free State Provincial, Metropolitan and District Municipalities have complied with the basic requirements for establishing a Disaster Management Centre**.** In this regard, the Free State Province qualifies for the establishment of six Disaster Risk Management Centres, namely the provincial, metropolitan and four district Disaster Management Centres, and all of them have the head of the centre appointed. Furthermore, of the four district municipalities, The Thabo Mofutsanyana and Xhariep Districts have not established their Disaster Management Centres yet, whilst the Fezile Dabi and Lejweleputswa Districts have centres that are not fully functional. The Mangaung Metropolitan Municipality is functioning without a Disaster Management Forum and the framework, whilst the Thabo Mofutsanyana and Xhariep Districts have not yet developed their Disaster Risk Management Plans.

Furthermore, the various structures and institutions such as the national, provincial and municipal Disaster Management Centres have been established to provide for a well-coordinated and integrated Disaster Risk Management Services. The purpose of these centres is to promote an integrated and coordinated system of Disaster Risk Management, with specific emphasis on prevention and mitigation of Disaster Risk Management in South Africa. Section 42 and 43 of the DMA (2002) provide for each district and metropolitan municipality to establish a Municipal Disaster Management Framework and a Disaster Management Centre.

In addition, as reflected in Table 6.14 above, the Disaster Risk Management officials in the Free State Province are experiencing challenges in the implementation of their Disaster Risk Management activities. The main reason is the lack of scientific and technical DRM expertise, which is essential to conduct Hazard Analysis and Risk Management. Lack of financial resources is also having a negative impact on the hiring skilled staff with the relevant technical expertise. Moreover, there is a lack of emergency service vehicles and communication devices, which are necessary for

effective Disaster Risk Management. Although these challenges are faced by the larger municipalities, the impact of these challenges is far greater on smaller municipalities at the forefront of the onslaught of disasters. Based on the above discussions one may argue that the Disaster Risk Management services offered by the Free State Municipalities are inadequate due to the lack of finance, equipment and staff shortages.

The next section discusses requirements for improving Disaster Risk Management services in the Free State Municipalities.

6.7.7 Requirements for improving Disaster Risk Management Services in the Free State Municipalities

Table 6.16 provides a summary of the findings of how Disaster Risk Management services in the Free State municipalities may be improved.

Table 6.16 Requirements for improving Disaster Risk Management services in the Free State municipalities

What must the Free State Municipalities do to improve the Disaster Risk Management services		
Theme	**Quotes from respondents**	**Codes/Meaning units**
Fewer meetings, more services	*"When a disaster is experienced in a community the relevant groups or centres seems to take time discussing issues instead of providing services on the day were communities are supposed to be rendered services (Less meetings more services to the communities and not wait for a certain sector to provide services first)."*	Poor response planning. If plans are in place, it is unclear why it is not being followed.
Continuous stakeholder engagements	*"Continuous stakeholder engagements; awareness and collaboration are key (both internal and external)."*	DRM is a multisectoral approach
Better human and budget capacity Including increased funding	*"Better human and budget capacity for especially post disaster support in agriculture linked disasters."* *"Get more funding for preparedness efforts."*	Post disaster support for agricultural disasters.
More training required	*"More training is required both practically and theoretically for the improvement of risk management services."*	More training required to improve Disaster Risk Management services.

Use of call-centre communication	*"Make use of call-centre communication using phones + SMS + emails."*	Improve Communication System for effectiveness.
Involvement of school children (foundation phase)	*"Involve school kids at foundation phase."*	Start DRM awareness campaigns early, at school level.
Improvement, communication and teamwork	*"Improve and communication and team work."*	DRM officials must be trained to work in teams/units for effectiveness

(Source: Researcher's own interpretation)

6.7.7.1 Findings and interpretation

Table 6.16 above indicates the main themes that DRM officials should take into consideration in order to improve the Disaster Risk Management services in the Free State Municipalities. The findings indicate that when a disaster occurs, the relevant stakeholders are engaged in many meetings to decide on the steps to be taken to restore the normal functioning of the community. The request is that the number of consultative meetings be reduced to accommodate disaster risk reduction programmes such as improving the communication system by using the call-centre system as an alternative. Another strategy could be the inclusion of Disaster Risk Reduction (DRR) modules at primary school level so that DRR becomes entrenched in the communities from an early age.

According to Chapter 2 of this study, the DMA (2002) discusses the establishment of Disaster Risk Management Centres by the metropolitan and district municipalities. The *Disaster Management Amendment Act, 2015* makes provision in Section 16(4) that a local municipality may establish a Disaster Management Centre in consultation with the relevant district municipality. This must be in accordance with the terms set out in a service level agreement and in accordance with national norms and standards. Furthermore, Section 45 of the DMA (2002) provides for a municipal council to appoint a person as head of the municipal Disaster Management Centre (MDMC). The main function of the MDMC is to provide direction in the implementation of disaster risk related policies to achieve provincial and national disaster risk related objectives.

Section 44(1) of the DMA (2002) makes provision for a Municipal Disaster Management Centre to specialise in disaster and disaster management issues in the

specific municipal area, and it promotes DRR by introducing prevention and mitigation measures by departments and all role-players within a municipality, promote disaster management capacity-building training in the municipal area including in schools and facilitate effective communication amongst the vulnerable communities in a municipality.

From the above discussion, one may argue that the respondents are unaware of the roles and responsibilities of the municipal Disaster Management Centre as espoused by the DMA (2002) and the NDMF (2005). It may also be argued that some Municipal Disaster Management Centres in the Free State Province do not provide adequate Disaster Risk Management Services as legislated in the DMA (2002) and the NDMF (2005).

The next section discusses the key elements that the respondents view as critical for the development of an integrated DRM model.

6.7.8 The most important elements of an Integrated Disaster Risk Management model

Table 6.17 Key elements that the respondents suggest is important for the development of an integrated Disaster Risk Management model

Most important elements of Disaster Risk Management		
Theme	**Quotes from respondents**	**Codes/Meaning units elements**
Collection accurate information	*"Collecting proper and true information in time."*	Hazard Analysis, Effective communication Hazard Analysis
Continuous readiness and risk assessments	*"Continuous readiness assessments; awareness; collaboration and institutional arrangements."* *"… high-level assessment of potential disaster with timely mitigation support."* *"Assessment of risks, identification of risks,*	Risk Assessment, response and recovery, Hazard Analysis, Response and Recovery Risk Management Risk Management Operations Management

	identification of responses for mitigation of risks."	
Budget availability immediately after disaster	*"… budget availability immediately after disasters to provide timely and comprehensive support to affected communities."*	Operations Management, Response and recovery Operations Management
Early warning	*"Early warnings. Severe weather alerts (advisories, warning and watches)."*	Early warning Systems, Operations Management
Preparedness, prevention and mitigation	*"Preparedness awareness. Mitigation."* *"Prevention, Preparedness, mitigation."* *"Preparedness, recovery and rehabilitation and mitigation and prevention."*	Operations Management Response and recovery Operations Management
Other	*"Poverty and for costly possible disasters. Often disaster occurred: the support is assisting. Disaster strike."*	Prevention and preparedness Operations Management

(Source: Researcher's own interpretation)

6.7.8.1 Findings and interpretation

The most important elements of Disaster Risk Management according to the respondents are identification of risks, risk assessment, preparedness and mitigation response, recovery and rehabilitation. Table 6.17 indicates the various concepts that respondents feel are important in the management of disaster risks. The findings reveal that the assessment of risks were prioritised, followed by preparedness, awareness, prevention and mitigation.

Chapter 4 of this study conducted an in-depth study of the various categories, purpose, benefits, characteristics and challenges that more than forty national and international models present. Chapter 4 of this study discussed the HFA (2005) as well as the Sendai Framework (2015), which supports the view of this study that there must be a common understanding of specific DRM terms and concepts so that the implementation of Disaster Risk Management services becomes effective. In addition,

a comparative analysis of seven different models from the NDMF (2005) was conducted in the context of the four Key Performance Areas and the three enablers (Chapter 4.12). The conclusion drawn is that the main elements are Operations Management, Hazard Analysis and Risk Management.

Chapter 7 of this study presents a graphical representation of the proposed integrated Disaster Risk Management model, showing the main elements: Operations Management, Hazard Analysis and Risk Management. Chapter 7.7.1 to 7.7.3 presents a step-by-step approach on how to use the model effectively. Based on this discussion, one may argue that the respondents are unaware of how to organise the various elements to get a common understanding of the important elements and concepts of Disaster Risk Management. Furthermore, it may be argued that the model allocates a specific place for each element in the Disaster Risk Management system so that officials may be assigned specific roles and responsibilities in the work environment and the findings show that no mention was may of Hazard Analysis, Risk Management or Hazard Analysis. For this reason, it may further be argued, that officials in the Free State Province do not work according to specific responsibilities: are Operations Management, Hazard Analysis and Risk Management.

The next section discusses the functioning of the Municipal Interdepartmental Disaster Management Committee.

6.7.9. Functioning of the Municipal Interdepartmental Disaster Management Committee in The Free State Province Table 6.18 below discusses how the Municipal Interdepartmental Disaster Management Committee (IDMC) in the Free State Province is functioning

Table 6.18 Functioning of the Municipal Interdepartmental Disaster Management Committee in the Free State Province

Functioning of the Municipal Interdepartmental Disaster Management Committee		
Theme	**Quotes from respondents**	**Codes/Meaning units**
Committee discusses data and comes up with relevant strategies for community upliftment	*"The committee discusses the collected data from the investigations then come up with relevant strategies on uplifting the community."*	Data collection Strategies to uplift community

Improvement of engagements at local level.	*"Engagements at local level can improve, majority of engagements happen at provincial and national level."*	Require more discussion at local level
Fair	*"Fair."*	IDMC is functioning is fair
Not attending	*"Not attending it."*	Respondents do not attend IDMC meetings
Co-ordination of stakeholder plans	*"Coordination as all stakeholder's plans must be provided to the MIDMC."*	Sectoral Plans submitted to IDMC
Still in progress	*"Still on the process to be launched however the primary function is to curb any type of disasters in the province."*	IDMC not yet operational IDMC responsible for all disasters.

(Source: Researcher's own interpretation)

Table 6.18 above shows the Interdepartmental Disaster Management Committee in the Free State Province that is responsible for the coordination of all Disaster Risk Management activities within the Free State Province.

6.7.9.1 Findings and interpretation

As indicated in Table 6.18 above, in the event of a disaster, data are collected from the affected community by the IDMC, which is then discussed either at provincial or national sphere, depending on the magnitude of the disaster. At this discussion, strategies are agreed upon to uplift the community so that their normal functioning may resume. Some of the respondents felt that there should be more discussion at local level to include the affected communities in decision-making. Therefore, one may argue that they are unaware of the existence of the IDMC or the manner in which decisions are taken. In addition, other respondents indicated that the IDMC had not been launched. It may be argued that these respondents might also be unaware of the existence of the IDMC.

Chapter 2 of this study discusses the recommendation made by the NDMF (2005) that all metropolitan and district municipalities must establish interdepartmental Disaster-Risk Management committees for their areas and that all district municipalities must establish Disaster Risk Management committees in district management areas. In addition, local municipalities should establish their own Disaster Risk Management

committees and ensure the establishment of Disaster Risk Management committees or forums in all municipal wards. The main purpose of this committee is to provide for cooperative governance on all matters pertaining to Disaster Risk Management, especially in securing the health and wellbeing of the people of South Africa, as stipulated in Chapter 3, Section (41b) of the *Constitution*, *1996*. Another function of this committee is to provide for a well-coordinated, unified response to disaster risks when the situation arises. Since the community is the first respondent to a disaster, it is in the best interests of the community and the local government to a coordinating committee or forum have in place to take responsibility for the management of disaster risks at local level. Therefore, one may argue that the non-existence of the ICDM may be attributed to the respondents not being aware of these prescripts namely, the requirements of the NDMF (2005) and Chapter 3, Section (41b) of the *Constitution, 1996*.

The next section discusses the functioning of the Provincial Interdepartmental Disaster Management Committee.

6.7.10 Functioning of the Provincial Interdepartmental Disaster Management Committee in the Free State Province

Table 6.19 Functioning of the Provincial Interdepartmental Disaster Management Committee in the Free State Province

Functioning of the Provincial Interdepartmental Disaster Management Committee		
Theme	**Quotes from respondents**	**Codes/Meaning units**
Provincial in charge of large scale disasters	*"The provincial is in charge of the large scale disasters all around municipalities and they are the ones who declared the state of disaster to national (State of provincial disaster)."*	PDMC responsible for major disasters in the province. They declare State of Provincial disasters)
Little experience	*"Have little experience on it but I see level of corporation between stakeholders."*	There is cooperation amongst the stakeholders.
Fair	*"Fair."*	IDMC functioning as fair
Coordination at meetings	*"Coordination at meetings at a high level according to information heard."*	Coordination of activities by IDMC is at a very high level.
First time attending forum	*"First time attending the forum."*	It is my first PDMAF meeting and am not aware of how the IDMC is functioning.
Fulfils its role	*"It fulfils its role since, from time to time, it meets."*	IDMC is fulfilling its role.
Huge task due to geographic formation	*"Huge task due to geographic formation of the Free State province."*	IDMC has a huge role to play since the Free State Province covers a large area.

(Source: Researcher's own interpretation)

6.7.10.1 Findings and interpretation

As shown in Table 6.19, the Provincial Interdepartmental Disaster Management Committee in the Free State Province is functioning well, since it receives cooperation and support from the local and district municipalities. However, some of the respondents rated the functioning of the provincial interdepartmental disaster management committee as fair, with the IDMC fulfilling its role and coordination being at a high level.

However, the discussion in Chapter 3 (Table 3.5) of this study indicates that the Free State Province qualifies for the establishment of six Disaster Risk Management Centres, namely the provincial, metropolitan and four district Disaster Management Centres and all of them have a head of the centre appointed. Of the four district municipalities, the Thabo Mofutsanyana and Xhariep Districts have not established their disaster management Centres, whilst the Fezile Dabi and Lejweleputswa Districts have centres that are not fully functional. The Mangaung Metropolitan Municipality is functioning without a Disaster Management Forum and Framework, whilst the Thabo Mofutsanyana and Xhariep Districts have not yet developed their Disaster Risk Management Plans.

In addition, Chapter 3 of this study highlights the vulnerability of the Mangaung Metropolitan Municipality in the Free State to earthquake disasters. Much-needed municipal finances are used for basic services delivery; consequently, the maintenance of critical infrastructure such as roads, bridges, dams and hospitals are neglected. Furthermore, Chapter 3 of this study discusses that the Free State Province requires additional funding and equipment, such as real time communication devices and scientific and technical expertise that is lacking in the Free State Provincial Disaster Management Centre. For these reasons, one may argue that inasmuch as the respondent's state that the IDMC is functioning well, as indicated in Table 6.19 above, this committee requires a lot of support and commitment from the politicians to function effectively.

6.7.11 Functioning of Provincial Disaster Management Advisory Forum in the Free State

Table 6.20 Functioning of the Provincial Advisory Forum in the Free State municipalities

Functioning of the Provincial Advisory Forum in the Free State municipalities		
Theme	**Quotes from respondents**	**Codes/Meaning units**
Important for information sharing	*"Important information is given which helps to prepare properly for seasonal disasters that can be expected and come with strategies to deal with those disasters. Updates are provided to reflect on past issues."*	Advisory Forum provide adequate information for seasonal disasters

	"Very important due to the fact that all sector departments attend and we share the same information."	All sectoral departments meet at the Advisory Forum, which plays a very important role.
Broad focus	*"The focus is broad and covers wide range of aspects."*	The Advisory Forum works with a wide range of DRM activities.
Functioning effectively	*"The PDMC is functioning effectively with its subcommittees, e.g. the drought task team."* *"It is working properly."*	The PDMAF is working very well with its sub-committees.
Exists but implementation is lacking	*"It exists but the implementation is lacking."*	The Advisory Forums do exist but they do not implement effectively.
Functional but Respondents must involve themselves	*"It is functional but the Respondents need to involve themselves more."*	The Advisory Forums do exist but there is a lack of involvement from members.
First time attending forum	*"First time attending the forum."*	First forum meeting and am not aware of how the forum is functioning.

(Source: Researcher's own interpretation)

6.7.11.1 Findings and interpretation

As shown by Table 6.19, the Free State Provincial Disaster Management Advisory Forum plays an important information-sharing role, where all sectoral departments and other stakeholders meet under normal circumstances once a quarter and sometimes more often. Furthermore, the respondents agreed that the Free State Provincial Disaster Management Advisory Forum provided adequate information for seasonal disasters where the poor and vulnerable communities were the beneficiaries. In addition, according to Table 6.19, the Provincial Disaster Management Advisory Forum plays a very important coordinating role for a wide range of Disaster Risk Reduction programmes. However, respondents also state that members must be more actively involved so that programmes may be implemented more effectively.

According to Chapter 1, the establishment of the Provincial and Municipal Disaster Management Advisory Forum in each province is not a legal obligation. This is in relation to the NDMF (2005), Section 54(1) (a-b). Since there is no legal basis for the establishment of a Provincial Disaster Management Advisory Forum, it will be difficult for a disaster to be coordinated provincially which is a requirement of the DMA (2002).

For this reason, the NDMF (2005:34) strongly recommends the establishment of the Provincial Disaster Management Forum or, in the absence of such a forum, to establish an alternative coordinating body. The PDMAF is a forum that functions within the ambit of the Provincial Disaster Risk Management Centre. It must be emphasised that the PDMAF is not a decision-making body, but only an advisory body that offers support and advice to the relevant authorities on all DRM initiatives in a province.

Although it is only an advisory forum, it plays a very significant role as far as DRM is concerned. This is so because it offers a platform to a wide range of stakeholders, with a stake, in the wellbeing of vulnerable communities, who are in most instances poor and needy (Van Riet and Diedricks, 2009: 4-6). Therefore, one may argue that it is in the best interests of all sectoral departments and other institutions, firstly, to become members of the PDMAF and secondly, to actively engage in all activities of the PDMAF.

The next section discusses the Hazard Analysis Process in the Free State Municipalities.

6.7.12 The Hazard analysis process in the Free State municipalities

Table 6.21 below shows the information regarding the Hazard Analysis process in the Free State Municipalities.

Table 6.21 The Hazard analysis process in the Free State municipalities

Hazard analysis process in the Free State municipalities		
Theme	**Quotes from respondents**	**Codes/Meaning units**
Identification of hazard/disaster	*"First so on site to identify what type of disaster has occurred take or collect data (Taken pics of the affected areas) and of*	Officials who arrive first on site normally take pictures and

Includes identifying the likelihood and occurrences of disasters	*the most affected (How best we can uplift the most affected and how we can provide information on how the community can prevent certain disasters from taking place).”* *“Hazards are identified by relevant SME's cause evaluated in terms of impact; likelihood of occurrence and frequency.”* *“We normally engage with our Department of Human Resource and Development directorate or occupational health and safety to assist with the identification of hazard together with security management at strategic level.”*	advise on how communities may be assisted. Relevant SMMEs conduct the Hazard Identification process assisted by the DHRD directorate and senior management from the security department
Support needed	*“When hazards occur inspections are done by officials, support needed calculated…*	When disasters occur, officials do the calculations.
Business plan and request for funds drawn up	*“… business plans and requests for funds drawn up and if and when funds are made available support is provided.”*	Business Plans are drawn requesting for funds.
Community based Residents involved in process	*“It is community-based where the affected residents are involved throughout.” “It is community-based whereby communities, farmers are engaged directly, assisted by local structures.”*	Hazard identification is community based, local structures work with farmers.
Security services responsible	*“The security services are always responsible for hazard & benefits the process.”*	Security services responsible for hazard identification and they benefit

(Source: Researcher’s own interpretation)

6.7.12.1 Findings and interpretation

Table 6.20 shows that the Hazard Analysis Process in the Free State Municipalities involves the identification of hazards in a municipality. The security services are responsible for hazard identification and the officials who arrive first on site normally take pictures and advise on how communities may be assisted. Furthermore, these security services normally benefit in the process. In other instances, senior management from the security department are involved in the Hazard Identification

process. They are assisted by the Department of Human Resource Development (DHRD) directorate and SMMEs. Hazard identification is also a community-based process where local structures work with farmers. After the hazards have been identified, Disaster Risk Management officials do the calculations and then Business Plans are drawn up, requesting for funds.

Chapter 7 of this study discusses the Hazard Analysis process, which involves Hazard Identification, Vulnerability Analysis and Risk Analysis. The hazard identification process involves the identifying and classifying of the hazards into either a community asset, economic asset or a natural asset. This means that if the hazards become a disaster, the Disaster Risk Management official must identify which of the three assets will be affected. These hazards are then analysed and mitigation programmes are developed to prepare communities to mitigate disasters, in other words, to lessen the impact of the disaster on that specific asset. The next step is to conduct a vulnerability analysis.

Vulnerability analysis is the degree of exposure of human population, critical facilities and/or the environment to the hazard. The analysis must include the frequency, duration, speed, geographical location, and magnitude of the hazard. Furthermore, it is important for local response teams (Vulnerable Response Teams), which are made up of people in hospitals, schools, prisons, day-care centres, environmental activists and other community-based organisations to conduct vulnerability assessments. In the absence of scientific equipment, historical data may be used. Information may also be sourced from the communities (Pine, 2015:10). The next aspect is the risk analysis.

Risk Analysis is conducted to understand the consequences of the impact of the hazards on vulnerabilities better, namely people and infrastructure. This involves the analysing the (probability) likelihood and severity (impact) should the disaster occur. Risk Analysis involves the estimation of the injury to people, damage to the environment, the economy, critical infrastructure and people.

If the discussion in Chapter 7 of this study is compared to the responses in Table 6.20 of this study, one may argue that Hazard Analysis is a process that is not followed by the municipalities in the Free State Province. For this reason, it may be argued, that

the Hazard Analysis process undertaken by the municipalities in the Free State municipalities are not adequate for effective Disaster Risk Management.

The next section discusses the Risk Management Process in the Free State Municipalities.

6.7.13 Risk Management process in the Free State municipalities

Table 6.22 below requires that the respondents to provide information regarding the Risk Management process in the Free State Municipalities.

Table 6.22 Disaster Risk Management process in the Free State municipalities

The Disaster Risk Management process in the Free State municipalities		
Theme	**Quotes from respondents**	**Codes/Meaning units**
Discussion of information collected	*"Discuss the information collected involve other stakeholders as to how we can work hand in hand to best help the affected come with solutions and how to deal with different types of disasters."*	Discuss collected information and work with stakeholders to address various disasters.
Risk Analysis conducted	*"Identification; cause analysis; impact (internal and external) likelihood of occurrence & frequency. Measures in place to deal with risk currently; institutional arrangements and resources in place; treatment plans."* *"A risk management unit in the Department of Agriculture and Rural Development supports all units to do risk analysis and standard tabled formats."* *"In PR&T, risk management is under the office of HOD and risk analysis is carried out on a quarterly basis for each directorate including monitoring of risks as well as found in the departments risk register."*	Identify risk, analyse risk, evaluate risk and treat risk. Standardised Risk Analysis templates are used Risk analysis is carried out quarterly and monitored according to the risk register Early warning issued.

	"Identify the potential risks then categories them, check for likelihood of occurrence then issue the warning." *"Risks are always determined and before they happen …*	
Meetings	*"Dairy joint meetings, events planning meeting."*	Daily Intersectoral planning meetings held
Extent of hazard used to make priority list	*"The extent of the hazard (severity) is used to make the priority list."*	Hazard priority list drawn up.
Prevention and Mitigation strategies	*"… employ mitigation and prevention strategies."*	Plan for mitigation and prevention strategies

(Source: Researcher's own interpretation)

6.7.13.1 Findings and interpretation

In order to conduct an effective Risk Management, hazard analysis must first be carried out and the hazards prioritised. Thereafter, multi-stakeholder community-based disaster-risk reduction meetings are held, together with sectoral departments to collect disaster-related information using a standardised template. The predominant disaster risks in municipalities are then identified, analysed, evaluated and treated. These community-based risk management meetings are carried out quarterly and early warning systems are designed to prepare communities as mitigation measures. For this purpose, a risk register is used to log the risk and monitor the treatment thereof. Prevention and mitigation strategies are then planned and instituted. The risk management process is a systematic step-by-step process, which is not demonstrated clearly by the respondents when conducting the risk management process in the Free State Municipalities. According to Chapter 7, Risk Management involves the identifying of specific disaster risks in a municipality, then analysing the disaster risks, evaluation the risk and lastly, monitoring disaster risks reduction initiatives.

The first step is identifying the disaster risk. When identifying the specific disaster risk, Disaster Risk Management officials must identify and describe the frequency, speed of onset, the areas affected, and the duration and magnitude of the hazard. Most importantly, the vulnerability of people (Social capital), critical infrastructure (economic

Capital) and environment (environmental capital) must be considered. This will help to calculate the likely costs, identify the capacity, gaps, inconsistencies, and efficiencies that are available to reduce the losses (NDMF, 2005:59-62). These important factors may assist in the planning and preparing for an impending disaster (Tau, 2006:19).

The second step when analysing the disaster risk, is that the Disaster Risk Management official has to establish whether the risk is a priority or not and then determine the severity of the expected impact (NDMF, 2005:62). Pine (2015:132) suggests that to establish whether a risk is a priority or not, the likelihood and consequences of the hazard, the voluntary or involuntary nature of the risk, the cost benefit ratios of mitigating the risks and the political and social ramifications of certain mitigation decisions must be considered. Once this analysis has been concluded, it may become easier to evaluate the risks, to decide on an action plan for the treatment (mitigation) of the risk (Pine, 2015; Smith, 2004).

The third step is the risk evaluation, which is a highly specialised, multidisciplinary, integrated and a comprehensive process that requires reprioritisation of the identified disaster risks, to establish whether there are any competing threats, which are assessed at the same level. All the threats cannot be addressed at the same time because scientific expertise, indigenous knowledge, finances and equipment are scarce resources in risk evaluation and which must be used efficiently (NDMF, 2005:63; Reddy, 2010:45).

The fourth step involves the monitoring and evaluation of disaster risk reduction programmes to ensure that the planned programmes are effective. What is more is that information collected up to this stage may be disseminated to the relevant stakeholders, which in turn may assist in the development of plans and programmes (NDMF, 2005:63).

Disaster Risk Management is a step-by-step methodical process lacking in the Free State Municipalities, as discussed above. Therefore, one may argue that the Disaster Risk Management officials in the Free State municipalities are either unaware of the risk management process as outlined in Chapter 7 of this study or do not have the capacity to conduct such a process.

The next section discusses the challenges experienced by Free State Officials when developing their Disaster Risk Management plans.

6.7.14 Challenges experienced by the Free State DRM officials when developing their Disaster Risk Management Plans

Table 6.23 depicts the challenges experienced by the Free State DRM officials when developing their Disaster Risk Management Plans.

Table 6.23: Challenges experienced when developing Disaster Risk Management plans in the Free State Province.

Challenges experienced by Free State officials when developing Disaster Risk Management plans		
Theme	**Quotes from respondents**	**Codes/Meaning units**
Lack of volunteers	*"Lack of volunteers to help when going on site."*	Volunteers not available
Knowledge of DMA (2002)	*"Lack of Knowledge of the act."*	Lack of knowledge in the DMA.
Collaboration and involvement	*"Collaboration between department resources."* *"To get involvement of all role-players."*	Difficult to bring together resources from other departments.
Still in process	*"It's still in the process. But the in-house development of the plan presents challenges regarding the flow of the plan, what items to include, etc."*	Municipalities find it difficult to develop plan because they are unsure of what hazards to include in the plan.
Changes in climate	*"Ever-changing climate changes."*	Climate change is also a challenge.
No challenges experienced	*"No challenges experienced. N/A"*	No challenges ae experienced.

(Source: Researcher's own interpretation)

6.7.14.1 Findings and interpretation

Table 6.22 depicts the challenges experienced by the Free State Disaster Risk Management (DRM) officials when developing their Disaster Risk Management plans in the Free State Province. Table 6.22 also shows the various themes such as the lack of knowledge of the DMA (2002). Some municipalities in the Free State Province find it difficult to develop DRM plans because they are unsure of what hazards to include

in their plans, combined with a lack of support from the sectoral departments and the influences of climate change.

Regarding the lack of knowledge of the DMA (2002), Chapter 2 of this study discusses the NDMF (2005), which was developed to assist municipalities to understand and implement the DMA (2002) that serves as a guiding tool for implementing effective Disaster Risk Management services. Furthermore, the delivery of effective Disaster Risk Management Services is based on four key performance areas, namely

- to develop institutional capacity to deliver effective Disaster Risk Management;
- to establish a uniform approach to assessing and monitoring disaster risks in South Africa;
- that all relevant role-players develop and implement integrated Disaster Risk Management plans according to approved legislation; and
- the implementation of an effective, integrated and coordinated rapid response, recovery and rehabilitation plans within all spheres of government (NDMF, 2005:111-129).

Furthermore, Chapter 2 of this study discusses the NDMF (2005), which is designed to assist municipalities in developing their own coherent, transparent and inclusive policies and plans on Disaster Risk Management in various municipalities in South Africa. For this reason, the Intergovernmental Committee on Disaster (Risk) Management (ICDM) was established comprising a wide range of government officials from national and provincial government departments, politicians, the private and business sector, and community members. The main purpose of this committee is to support municipalities by ensuring that policies and systems are in place for the rendering of effective Disaster Risk Management Services to the South African population. With such wide range of support, one may argue that the Disaster Risk Management officials are either unaware of the legislative prescripts, namely the DMA (2002) and the NDMF (2005), or it could also be argued that the Disaster Risk Management officials in the Free State Province are inappropriately qualified and are in need of the relevant training. Chapter 2 of this study also discusses the Enabler 2 that makes provision for education, training, public awareness and research-related matters concerning Disaster Risk Management.

Table 6.22 above also shows that respondents were unsure of what hazards to include in their Disaster Management Plans. In this regard, Chapter 7 of this study discusses in detail the Hazard Analysis process, which comprises Hazard Identification, Vulnerability Analysis and Risk Analysis. Under Vulnerability Analysis, it is very clear which hazards to prioritise and include in the Disaster Management Plan. The reason for this is that the likelihood or probability of the occurrence of the hazards and the severity or the impact of the hazard must be considered in order to be included in the Disaster Management Plan and then costed. Therefore, one may argue that these respondents were unaware of the Hazard Analysis process as discussed in the NDMF (2005).

The next section discusses the recommendations for a proposed Disaster Management model for the Free State Municipalities.

6.7.15 Recommending a Disaster Management model for the Free State Municipalities

Table 6.24 below discusses the recommendations for a Disaster Risk Management model in the Free State Province.

Table 6.24 Recommendations for a Disaster Risk Management model in the Free State Province

Recommending a Disaster Risk Management model for the municipalities in the Free State		
Theme	**Quotes from respondents**	**Codes/Meaning units**
YES: Provides a blue print	*"Yes, because then there is a blue print to be followed."*	DRM model is recommended because it provides a common reference for understanding Disaster Risk Management.
Minimises risk Disasters disruptive and costly Clearly defines roles and responsibility	*"Act on time, so that we can minimize the impact of the disaster."* *"Yes; disasters are disruptive and can be costly; for some recovery may be prolonged."*	A model will assist in planning for response and recovery. A model is recommended because disasters may disrupt communities and are very expensive. Models will help to reduce disaster costs
Helps make decisions	*"Yes; to clearly define roles and responsibility."*	A model is recommended because it will clearly define roles and responsibilities

	"Yes. IT will help make precision decisions - more relevant."	A model is recommended because it will assist in decision-making.
NO: Municipality deals with hazards; SAWS deals with weather	*"No, municipalities deal with multiple hazards and SAWS deals mainly with weather related."*	No a model is not recommended because municipalities deal with multiple hazards. No a model is not recommended because SAWS deals mainly with weather related disasters.
Other		

(Source: Researcher's own interpretation)

6.7.15.1 Findings and interpretation

Table 6.24 above shows the responses for the recommendations of a proposed Disaster Risk Management model in the Free State Province. It can be observed from the responses in Table 6.24 above that there is overwhelming support for the use of an integrated Disaster Risk Management model in the Free State Province. Various other themes have also emerged during the interview session such as a model may provide a blueprint for Disaster Risk Management officials to refer to when having a strategic planning workshop. In this regard the model to be used clearly defines roles and responsibilities of Disaster Risk Management officials for instance, officials may be assigned any one or a combination of responsibilities in Operations Management, Hazard Analysis or Risk Management responsibilities. A graphical model is a visual representation of a conceptual idea, which allows for a common understanding of some technical concepts that may be used in the management of disaster risks. Furthermore, a Disaster Risk Management model may be useful because it may help in decision-making. For instance, a model may prescribe the Hazard Analysis or Risk Management process for which the costs may be calculated accurately. These costs may then be indicated in the budget document.

However, some respondents did not recommend a model. The reason put forward by these respondents was, "municipalities deal with hazards whilst the South African Weather service deals with the weather". It may be argued that these respondents were unaware that there are man-made and natural disasters. Thus, natural disasters may be caused by adverse weather such as floods and droughts or anthropological (man-made) disasters, which may be caused by human intervention such as urban

fires, weapons of mass destruction and technological disasters. Therefore, one may argue that respondents who did not recommend a model were unaware of the benefits and purpose of Disaster Risk Management models. It may also be argued, that respondents who did not recommend a model might be unaware that Disaster Risk Management is a multisectoral, multidimensional collaborative service-delivery imperative.

The next section discusses Disaster Risk Management as a function in the Free State Municipalities.

6.7.16 The functioning of Disaster Management in the Free State municipalities

Table 6.25 below shows the responses to the functioning of Disaster Risk Management in the Free State Province.

Table 6.25 Functioning of Disaster Risk Management in the Free State Province

Understanding Disaster Risk Management as a function in the Free State Municipalities		
Theme	**Quotes from respondents**	**Codes/Meaning units**
Community upliftment	*"Uplift communities."*	Develop communities
Service provision	*"Provide services on time."* *"Ensuring reaction on time and normalizing the situation speedily."*	Effective Response to normalize the situation.
Required at every level/ All hands -on deck	*"It is required at every level of critical organisations like Eskom; due to the impact in society and the country."* *"It needs all hands on deck. It needs buy in and commitment of principals for funding purposes."*	DRM requires senior management commitment.
Preventative measures	*"Preventative measure to ensure effective and efficient ordinal disaster forum."*	Preventative measures are important
Platform to discuss challenges and help each other	*"platform where all involved in your Department & organisation to discuss the challenges and help each other to*	DRM is a multisectoral platform that communities may use to resolve challenges.

	reveal a common goal in serving the community."	
SAWS – advisory role	*"SAWS role is mainly advisory."*	Weather Services advise the forum
Part of effective Disaster Risk Reduction	*"It forms part of an effective disaster risk reduction."*	DRM forms part of DRR
Complex subject due to changing climate	*"A very complex subject due to the ever changing climate as well as weather in the short term."*	DRM is a complex subject because of climate change.
Other	*"A function that manages and plans for the occurrence of disaster and how to go about mitigating disasters before any could take place."* *"Assessment of disasters and potential disasters, mitigation support decided and provided post disaster support decided on and provided this in the context of disaster risk reduction, preparedness, response and recovery and rehabilitation with prevention and mitigation."*	Disaster Risk Management is the planning for disasters before they occur. Disaster Risk Management is the support provided for disaster risk reduction, preparedness, response and recovery and rehabilitation with prevention and mitigation

(Source: Researcher's own interpretation)

6.7.16.1 Findings and interpretation

Table 6.25 above presents an understanding of how Disaster Risk Management in the Free State Province is functioning. As may be observed in Table 6.25 above, several themes emerged during the interviews, some of which are that Disaster Risk Management is about developing communities; it is an effective response to normalise a situation after a disaster. Other themes that emerged are that it is a multisectoral platform, which may be used to resolve community-based challenges; it is the planning for disasters before they occur and Disaster Risk Management is the support provided for disaster risk reduction, preparedness, response and recovery, and rehabilitation with prevention and mitigation.

According to Table 3.5 of this study, the Free State Province qualifies for the establishment of six Disaster Risk Management Centres, namely the provincial, metropolitan and four district Disaster Management Centres and all of them have the head of the centre appointed. Of the four district municipalities, the Thabo Mofutsanyana and Xhariep Districts have not established their Disaster Management Centres, whilst the Fezile Dabi and Lejweleputswa District have centres that are not fully functional. The Mangaung Metropolitan Municipality functions without a Disaster Management Forum and the Framework, whilst the Thabo Mofutsanyana and Xhariep Districts have not yet developed their Disaster Risk Management Plans. Based on this discussion, one may argue that the Disaster Risk Management officials are unaware of the prescripts of the NDMF (2005), Key Performance Area 1 and are therefore not complying with the institutional arrangements (KPA 1) for effective Disaster Risk Management in the Free State Province is inadequate.

Furthermore, The South African Local Government Association (SALGA), commissioned the North-West University (NWU) to conduct a study on the status of Disaster Risk Management in South Africa during the year 2011 (Chapter 1). This study was conducted to establish the requirements for a coherent, multidisciplinary, multisectoral and a coordinated approach to Disaster Risk Management in South Africa (Botha and Van Niekerk, 2011:97-100). The findings indicate that most municipalities, including the Free State Municipalities, operate at a very low level regarding Disaster Risk Management. Lack of finance and financial management capacity, inadequate and ineffective response and recovery machinery, outdated communication devices, lack of political will and insufficient involvement of government departments were quoted, as some of the reasons for ineffective functioning, of Disaster Risk Management in South Africa (Botha and Van Niekerk, 2011:97-100).

In Chapter 2 of this study, it was also found, that there was a lack of effective communication amongst the various role-players, namely the politicians at national, provincial and local levels regarding Disaster Risk Management in South Africa. As a result, the effectiveness of Disaster Risk Management as a service-delivery imperative has been compromised. Further to the lack of communication, Van Niekerk also found that that there was very little cooperation amongst the various structures of

government (Botha and Van Niekerk, 2011:97-100). Therefore, one may argue that the functioning of Disaster Risk Management Services in the Free State Province is not functioning effectively.

The next section discusses Disaster Risk Management Training needs for the DRM officials in the Free State Municipalities.

6.7.17 Disaster Risk Management training needs in Free State organisations

Table 6.26 Disaster Risk Management training needs required in Free State Province

Aspects of Disaster Risk Management training needs in the Free State municipalities		
Theme	**Quotes from respondents**	**Codes/Meaning units**
Health risks on site	*"Health risks that can be faced on site."*	Occupational Health and Safety training
Management of multiple disasters	*"How to manage multiple disaster occurrences that happen at the same time on site."*	Effective planning and coordination of disaster response and recovery.
Awareness to broader organisation	*Awareness to the broader organization."*	Awareness campaigns and capacity building for sectoral departments.
Business continuity planning	*"Business continuity planning."*	Training DRM Business Continuity Planning.
Training development strategies	*"The correct approach method and methodology to develop plan and training of facilitation. Training the trainer."*	Develop accredited training programmes
Risk, hazard and disaster assessment	*"Hazard and disaster assessing."* *"Risk assessment; Hazard assessment; because the entire* Disaster Risk Management *revolves around hazard and risk."*	Risk Management, Hazard Analysis and Operations Management training
Evacuation plans	*"Evacuation plans in case of fire or escape routes in that regard."*	Training in Response and Recovery Evacuation plans
General understanding of DRM	*"A general understanding of DRM is necessary because DRM is misunderstood to being a reactive function. Might seem irrelevant until a disaster strikes." "General training on the need for our department to have a DRM unit because it*	Training programmes in effective DRM

	becomes easier to get involved and fund the function."	

(Source: Researcher's own interpretation)

6.7.17.1 Findings and interpretation

Table 6.26 depicts the responses to the Disaster Risk Management Training needs that is required by the officials in the Free State Province. In this regard, various themes for training and development emerged, as shown in Table 6.26. Some of which are Occupational Health and Safety training, planning and coordination for effective disaster response and recovery, awareness campaigns and capacity building for sectoral departments, Risk Management, Hazard Analysis and Operations Management training. These training programmes should be accredited.

In this regard, Chapter 2 of this study discusses Enabler 2 prescribed in the NDMF (2005) the Disaster Risk Management priorities in education, training, public awareness and research. Enabler 2 further describes mechanisms for the development of education and training programmes for Disaster Risk Management and associated professions and the incorporation of relevant aspects of Disaster Risk Management in primary and secondary school curriculums. It addresses requirements to promote and support a broad-based culture of risk avoidance through strengthened public awareness and responsibility. It also discusses priorities and mechanisms for supporting and developing a coherent and collaborative disaster-risk research agenda. Chapter 2 also refers to Section 22 of the *Disaster Management Amendment Act, 2015*, which makes provision for specific regulations concerning disaster management education, training and research related aspects including the classifications of disasters (*DMA Amendment Act, 2015*).

In addition, Chapter 2 discusses Disaster Risk Management (DRM) Software Package which was developed by the African Centre for Disaster Studies at the North-West University in collaboration with a software company to assess a wide variety of hazards and vulnerabilities. This Disaster Risk Management Software Package makes use of specific formulae and scales to rank and measure hazards and vulnerabilities. Furthermore, the Disaster Risk Management Software Package can be used to view all settlements within fire-prone areas and it allows users to have access to various

different templates and reports such as Disaster Management Plans to assist users with their planning process. This software package could also be used as a training instrument to capacitate Disaster Risk Management officials in the Free State municipalities (Vermaak and Van Niekerk, 2004:562). Therefore, one could argue that there is a need for promoting extensive accredited training programmes in Disaster Risk Management within the Free State Municipalities.

The next section addresses the Resources requirements for the municipalities in the Free State Province.

6.7.18 Disaster Risk Management resources that Free State municipalities need urgently

Table 6.27 shows the resources required by the Disaster Risk Management officials in the Free State province.

Table 6.27: Disaster Risk Management resources required by Municipalities in the Free State Province

Most urgent resources required by Municipalities in the Free State		
Theme	**Quotes from respondents**	**Codes/ Meaning units**
Transport assistance/ vehicle equipment	*"Transportation assistance."* *"Vehicle equipment."*	Response and recovery vehicles
Food and clothing donations	*"Food donations."* *"Clothes donations."*	Canned Food and blankets and Clothing
Engagement and collaboration of key state organisations	*"Engagement and collaboration with key state organisation mandated to deal with national disasters." "Cooperation from all stakeholders in ensuring reporting of events in order to analyse the weather activity for monitoring of future events."*	Support from sectoral departments Weather modelling/predicting instruments
Budget/ funding	*"Budget."* *"Only budgets needed for when disasters occur and support needs to be provided."* *"Funding."* *"Financial."*	Post Disaster Financial support

Human resources (manpower)	*"Human resources."* *"Human resources. If farms (DRDLR) are affected by fire, for example it would be difficult for them to control while waiting for professionals."*	Skilled personnel in DRM
Support	*"Only budgets needed for when disasters occur and support needs to be provided."*	Post-Disaster financial support
Disability assistance	*"Emergency trolley for the disabled people. This is the only one I can get for now as it would be problem should a fire occur if this trolley is not there it would be difficult to assist in evacuating disabled people from the building."*	Fire emergency rescue equipment/sledges and chutes
Infrastructure	*"Infrastructure (automatic station in every municipality for weather monitoring)."* *"Infrastructure."*	Weather monitoring equipment
Equipment	*"Equipment."*	DRM equipment

(Source: Researcher's own interpretation)

6.7.18.1 Findings and interpretation

Table 6.27 shows the Disaster Risk Management resources that officials at the Free State Disaster Risk Management institutions require. Some of the important emerging themes are Response and recovery vehicles, Support from sectoral departments, Weather monitoring/modelling/predicting equipment, Fire emergency-rescue equipment/sledges and chutes and technically skilled personnel in Disaster Risk Management. Chapter 2 of this study discusses Enabler 3 of the (NDMF, 2005). The NDMF (2005) sets out the mechanisms for the funding of Disaster Risk Management in South Africa. The NDMF (2005) also discusses information management and communication system, education and training strategies that are in place for each imperative in KPA 3. In addition, Chapter 2 of this study discusses Section 2 of the MFMA (2003), which makes provision for the management of revenues, municipal expenditures, the municipal assets and liabilities including the handing of municipalities financial affairs, financial planning and budgeting, borrowing and supply chain management.

Since Disaster Risk Management plans form part of the municipalities' integrated development planning process, municipalities must take into account the Disaster Risk

Management Plan of that municipality in its budget development. Thus, one could argue that mechanisms and systems are in place for effective Disaster Risk Management; however, the implementation thereof is lacking.

6.8 SUMMARY OF THE QUANTITATIVE AND QUALITATIVE FINDINGS

The findings from the literature review in Chapter 2 and 3 clearly show that there is an increase in the number of disaster events leading to human suffering of huge proportions and costing the South African economy large sums of money which could be better utilised on preventative measures that would cost much less. This summary discusses firstly the Profile of Disaster Risk Management officials in the Free State Province, the compliance with the Disaster Risk Management Legislative Frameworks in the Free State Province and the functioning of Disaster Risk Management in the Free State Province.

6.8.1 Profile of Disaster Risk Management officials in the Free State Province

In the course of their duties, some senior Disaster Risk Management officials will be required to take decisions, which may have a negative impact on critical infrastructure such as the economy. This is why critical thinking and decision-making are regarded as important attributes for senior managers working in the Disaster Risk Management field. In this regard, Chapter 6.4.2 shows that a large majority (48%) of respondents who function at a strategic level have very little experience (3-5 years) to carry out Disaster Risk Management Services effectively in the Free State Province. For this reason, it may be argued that these respondents do not have sufficient experience at a senior level to take decisions of a critical nature. Furthermore, Chapter 6.5.1 shows that a large majority (41%) of the respondents working in the Disaster Risk Management field do possess the required level of qualification (NQF Level 6 or higher). However, one may argue that the qualifications of these officials are unrelated to Disaster Risk Management.

Chapter 6 also discusses Disaster Risk Management as a service-delivery imperative, which is not given the priority it deserves in the Free State Province. This is supported by Table 6.14, which shows some of the severe DRM challenges experienced in the Free State Municipalities such as DRM policies not being implemented effectively

because of a critical shortage of skilled staff. In one instance, only the DRM coordinator was appointed with no other support staff; in another instance, Disaster Management is run by a Community Service Manager.

For this reason, it may be argued that there is a great shortage of Disaster Risk Management (DRM) skills in the Free State Province. It may also be argued that political will and support are required to appoint senior staff with the necessary skills set. Furthermore, one may argue that because of the critical shortage of Disaster Management technical skills in the Free State Province, the ineffective implementation of the DMA (2002) and the NDMF (2005) is apparent. From the above discussion, it may be concluded that there is a lack of Disaster Risk Management capacity in the Free State Province to render effective Disaster Risk Management services.

6.8.2 Compliance with the Disaster Risk Management legislative frameworks in the Free State Province

Chapter 2 of this study discusses the tremendous strides South Africa has made in developing Disaster Risk Management legislative frameworks, from a reactive civil protection, response and recovery approach to a more holistic, proactive Disaster Risk Management system. For this reason, the DMA (2002) and the NDMF (2005) are highly rated internationally. However, many of the municipalities in South Africa are still inundated with ineffective implementation strategies of the DMA (2002) and the NDMF (2005).

According to Chapter 3, Table 3.5, not all spheres of Government in the Free State Province have developed their Disaster Management Framework. Some of the main Disaster Risk Management challenges identified in the Free State Province include a lack of understanding of the DMA (2002) and the NDMF (2005). This lack of understanding of important DRM legislative frameworks has resulted in inadequate financial arrangements, lack of skilled staff and lack of political will and support. In contrast, some of the positive findings were frameworks have been developed, are that the Frameworks are effective and they are assisting in improving Disaster Risk Management as a service-delivery imperative. Thus, the Disaster Risk Management Framework is an important guiding blueprint that municipalities may use in the development of their Disaster Risk Management Plans.

Chapter 6 shows that only 35% of the respondents agree that the Provincial Disaster Management Centre complies with the requirements of the DMA (2002) and the NDMF (2005) and only 20% of the respondents were neutral. One could argue that the respondents who remains neutral were either not sure of, or not aware of the prescripts of the DMA (2002) and/or the NDMF (2005).

Moreover, Chapter 6 also shows that the majority (57%) of the respondents disagree that the Mangaung Metropolitan Disaster Risk Management Centre complies with the requirements of the DMA (2002), only 14% of the respondents were neutral and 29% agreed that it complied with the DMA (2002). This is a concern, since the majority of the respondents (57%) disagreed that the Mangaung Metropolitan Disaster Risk Management Centre complied with the requirements of the DMA (2002).

What is also noticeable in Chapter 6 is that 39% of the respondents agreed that the District Disaster Risk Management Centre complied with the requirements of the DMA (2002). Only 23% of the respondents were neutral and 39% disagreed that it complied with the DMA (2002). It is also of concern that the 39% of the respondents disagreed that the District Disaster Risk Management Centre complied with the requirements of the DMA (2002). One may argue that a large percentage (23%) are unsure or unaware of the legislative requirements in terms of the DMA (2002) for the effective functioning of the District Disaster Risk Management Centre in the Free State Province.

According to the NDMF (2005), the role of the Provincial Disaster Management Centre is to support an oversight role the various metropolitan, district and local Disaster Management Centres. In addition, the NDMF (2005) states that it is the responsibility of the National Disaster Management Centre to support the Provincial Disaster Management Centres in their application of the various Disaster Risk Management-related legislation. These legislations are *Constitution, 1996*, MSA (2000), DMA (2002) and NDMF (2005).

Chapter 6 presents the functioning of the DMA (2002) within Free State Municipalities. Most respondents indicated that the lack of management support, funding, shortage of skilled staff and ineffective communication systems affected the successful implementation of the DMA (2002). Furthermore, junior officials were often sent to attend Disaster Risk Management meetings, which affected the consistent application

of the DMA (2002), which in turn affected Disaster Risk Management service delivery. The lack of understanding of the application of the DMA (2002) by the sectoral departments is also of concern, since they too are also not supportive of its implementation.

For these reasons, one may argue that the inadequate compliance with the Disaster Risk Management legislative frameworks, namely the DMA (2002) and the NDMF (2005), hampers the delivery of effective Disaster Risk Management services in the Free State Province.

6.8.3 Effective functioning of Disaster Risk Management in the Free State Province

As discussed in Chapter 3 of this study, it is the responsibility of the Free State Provincial Disaster Risk Management Advisory Forum (PDMAF) to support the effective functioning of Disaster Risk Management in the Free State.

Thus, the responsibility of the PDMAF of a province is to advise the sectoral departments and the hazard specific task teams to meet regularly to address priority disaster risks such as nuclear emergencies, flooding, climate change, earthquakes and hazardous-materials incidents. Regular meetings will ensure that Disaster Management Centres are prepared for any hazard-specific emergencies at all times. In addition, regular meetings will assist in the planning for a well-coordinated multisectoral approach to the management of disaster risks. In this way, it will become easier to get many entities involved to ensure that the management of disasters takes place at an acceptable level (CoCT DMP, 2011:10 -11).

According to Chapter 4, Table 4.5 of this study, the Free State Province qualifies for the establishment of six Disaster Risk Management Centres, namely the Provincial, Metropolitan and four district Disaster Management Centres, all of which have the head of the centre appointed. However, the Thabo Mofutsanyana and Xhariep Districts have not established their Disaster Management Centres yet, whilst the Fezile Dabi and Lejweleputswa District have centres that are not fully functional. The Mangaung Metropolitan Municipality, on the other hand, functions without a Disaster Management Forum and its Framework. The Thabo Mofutsanyana and Xhariep Districts have also

not developed their Disaster Risk Management Plans. For these reasons, one may argue that not all municipalities in the Free State Province function effectively.

In support of the above discussion, Chapter 3 of this study further illustrates the ability of the Free State provincial, metropolitan, district and local municipalities to render effective Disaster Risk Management services. The findings discussed in Chapter 4 (Table 4.5) of this study reveal that the Disaster Risk Management services provided by Free State municipalities are not at an adequate level. The literature reviews and the empirical studies also support the need for a common understanding of the basic tenets of Disaster Risk Management, especially the key concepts (NDMF, 2005:148).

Chapter 6 of this study emphasises section 29 and section 43 of the DMA (2002), which provides for each sphere of government to ensure that Disaster Risk Management Centres are established. In addition, Chapter 2 of this study discusses Section 1.2.4 of the NDMF (2005), which places a statutory responsibility on every organ of state in each sphere of government to establish Disaster Risk Management (DRM) centres. Although the main purpose of the DRM Centres in the Free State is to provide adequate support to all municipalities within its jurisdiction, many municipalities are still in need of more DRM support, as shown in Chapter 6 of this study.

In addition, Chapter 6 shows that 67% of the district respondents agreed that there was a need for an integrated Disaster Risk Management model to be introduced in their municipalities, whilst only 33% disagreed. Thus, it may be argued that there is overwhelming support for the introduction of an integrated Disaster Risk Management model in the Free State Province. Thus, this study proposes an integrated Disaster Risk Management model, which, if used appropriately, will greatly reduce disaster risks in the Free State province. For Disaster Risk Management to be effective, this proposed integrated Disaster Risk Management model emphasises the common understanding of Operations Management, Hazard Analysis and Risk Management, which are its three core elements (NDMF, 2005:2-148).

According to Chapter 6 (Table 6.9 and 6.10), the lack of skilled personnel and inadequate funding makes it difficult for municipalities to implement the four Key Performance Areas as stated in the NDMF (2005). However, Table 6.9 and Table 6.10

also identify some positive aspects, which include that within some municipalities, the DRM Frameworks established are in line with the DMA (2002), the District Disaster Risk Management Frameworks, where developed, adequately address the Disaster Risk Management challenges experienced by that municipality. In addition, some DRM officials prioritise the DRM challenges experienced by communities and are supportive of communities, especially in times of disaster incidences.

From the above discussion, one may argue that the Disaster Risk Management services in the Free State Province do not function in accordance with the DMA (2002) as well as the NDMF (2005). To ensure a reasonable degree of effectiveness, Disaster Risk Management must become “everybody’s business”. Thus, the multisectoral, multidimensional approach to Disaster Risk Management, which was once the sole domain of the engineering community, is rapidly changing to include other sectors to bring about a new dimension to Disaster Risk Management (Guzman, 2013:1).

6.8.4 Proposed Integrated Disaster Risk Management model for the Free State municipalities

Disaster Risk Management (DRM) models add to our understanding of complex social, economic and physical events that interplay with Disaster Risk Management. Pine (2015:60) and Kelly (1998:25) argue that models assist with the visualising, simplifying and understanding of complex concepts that make up models. Since all municipalities in the various spheres of government in South Africa are required by legislation to provide Disaster Risk Management services of acceptable levels, it is important that all officials and volunteers have a common understanding of the functioning of Disaster Risk Management. Since Disaster Risk Management in the Free State Province is ineffective, a proposed integrated DRM model could be used to have a common understanding of the key concepts of Disaster Risk Management. Thus, the common goal of effective Disaster Risk Management may be achieved easily (Pine, 2015:60; Kelly, 1998:25, in Asghar *et al.,* 2011:25).

The next section discusses the findings of the empirical study, which sought to establish whether there is a need for using an integrated Disaster Risk Management model in the Free State Province.

Chapter 6, Figure 6.5 of this study discusses the findings of the quantitative study. It can be seen in this figure that 66% of the Provincial Respondents agreed that there was a need for an integrated model to understand Disaster Risk Management better, whilst 34% disagreed. With regard to the Mangaung Metropolitan Municipality, 64% of the respondents agreed that there was a need for an integrated Disaster Risk Management model, whilst 36% of the respondents disagreed. The district respondents in the Free State Province also responded in a similar way, where 67% of the district respondents agreed that there was a need for an integrated Disaster Management model, whilst only 33% of the district respondents disagreed.

From the above discussion one may argue that majority of the respondents (between (64% and 67%) from the DRM centres of the provincial, metropolitan and the district municipalities within the Free State Province were in agreement that a DRM model would assist officials in understanding DRM better. However, between 33% and 36% of The Free State Provincial, Metropolitan and District Municipalities stated that there was no need for using an integrated DRM model. Thus, one could argue that respondents who disagreed that an integrated Disaster Risk Management model would benefit them were not familiar with the benefits, purposes and importance of integrated DRM models.

The findings of the quantitative study are supported significantly by the findings of the qualitative study discussed below.

Chapter 6, Table 6.24 of this study reflects the recommendations for a Disaster Risk Management model in the Free State Province. It can be observed from the responses in Chapter 6, Table 6.24 of this study that there is overwhelming support for the usage of an integrated Disaster Risk Management model in the Free State Province. Various other themes emerged during the interview session, such as that a model might serve as a blueprint for Disaster Risk Management officials in the Free State Province to refer to when having a strategic planning workshop. The model might also be used to define roles and responsibilities of Disaster Risk Management officials, for instance, officials might be assigned any one or a combination of responsibilities in Operations Management, Hazard Analysis or Risk Management responsibilities. A graphical model is a visual representation of a conceptual idea, which allows for a common understanding of some technical concepts that might be used in the management of

disaster risks. The proposed integrated DRM model might prescribe the Hazard Analysis or Risk Management process for which the costs might be calculated accurately and based on these calculations, decisions might be made. These costs might then be indicated in the budget document.

However, some respondents did not recommend a model. The reason put forward by these respondents was that *"municipalities deal with hazards whilst the South African Weather service deals with the weather".* It may be argued that these respondents were unaware that there are manmade and natural disasters. Thus, natural disasters may be caused by adverse weather such as floods and droughts or anthropological (manmade) disasters, which may be caused by human intervention such as urban fires, weapons of mass destruction and technological disasters. Therefore, one may argue that respondents who did not recommend a model were unaware of the benefits and purpose of Disaster Risk Management models. It may also be argued that respondents who did not recommend a model might be unaware that Disaster Risk Management is multisectoral, multidimensional and a collaborative service-delivery imperative.

Chapter 4 discusses the purpose of models and emphasises that a well-designed model makes it easier to develop and implement strategic policy decisions. Moreover, Pine (2015:60) stresses the importance of understanding how Disaster Risk Management models function so that the purposes for which they were designed are met successfully. Thus, the proposed integrated Disaster Risk Management model facilitates the better understanding of the functioning of DRM to avert large-scale social and economic losses.

For these reasons, one may argue that the benefits of using the proposed integrated Disaster Risk Management model for a common understanding of the tenets of Disaster Risk Management, which will promote effective DRM services should not be minimised. In addition, integrated DRM models may be used for critical decision making, assigning roles and responsibilities to Disaster Risk Management officials and promoting a common understanding of the technical concepts such as operations management, hazard analysis and risk management.

6.9 CONCLUSION

The aim of the study is to contribute positively to the improvement of Disaster Risk Management within municipalities in the Free State Province by developing and proposing an integrated Disaster Risk Management model, which should assist municipalities in the Free State Province, to plan, implement and manage disasters risks effectively. Thus, the proposed integrated Disaster Risk Management model may be used by municipalities in the Free State Province to render effective Disaster Risk Management services with the limited resources at their disposal.

To develop the proposed integrated Disaster Risk Management model, an extensive literature review was conducted which included analysing over forty national and international Disaster Risk Management models. Furthermore, an empirical study was conducted using quantitative and qualitative approaches to consolidate the findings, which overwhelmingly support the need to use an integrated Disaster Risk Management model to improve the Disaster Risk Management services in the Free State Province.

The findings from the literature review in Chapter 2 and 3 clearly show that there is an increase in the number of disaster events leading to human suffering of huge proportions and costing the South African economy large sums of money, which could be better utilised on preventative measures that would cost much less.

This summary firstly discusses the Profile of Disaster Risk Management officials in the Free State Province, the compliance with the Disaster Risk Management Legislative Frameworks in the Free State Province and the functioning of Disaster Risk Management in the Free State Province. This study then proposes an integrated disaster risk-management model to facilitate the provision of adequate Disaster Risk Management services in the Free State Province.

Furthermore, the challenges faced by Disaster Risk Management officials within municipalities in the Free State Province pose a serious threat to sustainable development and poverty alleviation. Therefore, if the proposed integrated Disaster Risk Management model is used effectively, it could substantially improve the quality

of Disaster Risk Management services in the Free State, as well as within other South African municipalities.

The next chapter, which is the final chapter for this study, presents the conclusion and recommendations of this study.

CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

7.1 INTRODUCTION

The previous chapter presented the results of the empirical findings, which are quantitative and qualitative by nature. This chapter provides a summary of the study, which includes an analysis of the findings and recommendations for further study.

This study has shown that Disaster Risk Management is an important service-delivery imperative in the Free State Province. Due to a lack of resources, insufficient funding and equipment, and the high number of disaster-related incidences, Disaster Risk Management as a municipal service is ineffective. Furthermore, this study found that the increasing number of disaster incidences has caused many deaths and significant natural and economic losses throughout the country. Since these losses pose a serious threat to sustainable development and poverty alleviation, this study proposes an integrated Disaster Risk Management Model. If the proposed integrated Disaster Risk Management Model is implemented appropriately, it will assist municipalities in the Free State Province to plan, implement and manage disaster risks effectively.

This chapter is the final chapter of the study, which succeeds the analysis and interpretations that were concluded in Chapter 6. The findings are used and linked with the literature reviewed to make some recommendations as part of the objectives of the study. Recommendations about further research areas related to this study are also identified and proposed. It is important to acknowledge the limitations of the study, which add to the credibility of the findings. In Chapter 7, specific conclusions are drawn and recommendations are made concerning Disaster Risk Management.

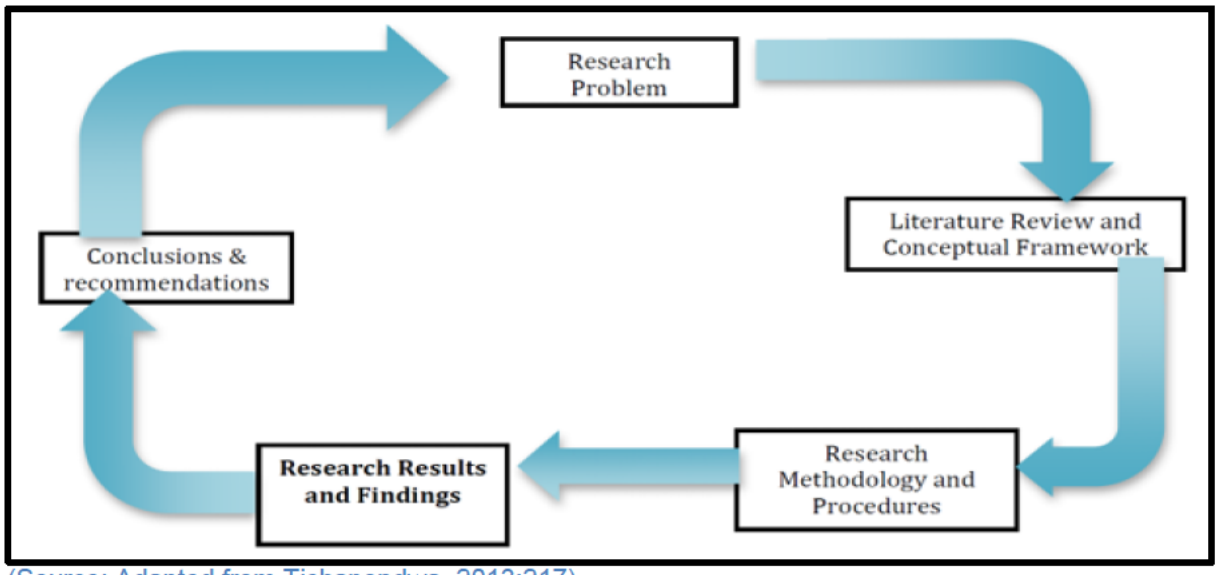
7.2 THE RESEARCH PROCESS

The lack of an integrated Disaster Risk Management model in municipalities in the Free State Province is having a negative impact on Disaster Risk Management services. Thus, the aim of the study is to contribute positively to the improvement of Disaster Risk Management within municipalities in the Free State Province by developing an integrated Disaster Risk Management Model that would assist

municipalities in the Free State Province to plan, implement and manage disaster risks effectively.

In achieving the aim of this study, a five-step research process as indicated by Figure 7.1 below was undertaken. Firstly, the research problem was formulated, secondly a conceptual framework was developed, thirdly, an approach (research methodology) was developed to conduct the research. Fourthly, the results and findings were discussed and lastly, conclusions were drawn and recommendations were made.

Figure 7.1 Critical elements of the research process



(Source: Adapted from Tichapondwa, 2013:217)

The main purpose of Figure 7.1 is to demonstrate how the five critical elements of research were followed in this study. It must be emphasised that although the five-step process demonstrated above follows a step-by-step process, this study was iterative and cyclic. There was always a continual going back and forth (process), constantly reviewing and updating the various sections of the research (product) (James and Slater, 2014).

7.2.1 Step One

The first step was to provide the background and purpose of the study. This was followed by a clearly delineated research problem, the aims, objectives and a detailed description of the research question.

7.2.2 Step Two

In the second step, a theoretical and conceptual framework was developed to indicate the precise route for this study. Firstly, various literature such as scientific journals, dissertations, related books, policies, acts and government reports were examined to get a thorough understanding of the Disaster Risk Management principles, concepts and models. Previous studies were also examined, analysed and discussed and after a thorough understanding of Disaster Risk Management as a municipal service, a conceptual and theoretical framework was developed to answer the research questions in order to achieve the objectives. Although Disaster Risk Management is generally represented in the form of a cycle, this study supports that all phases must function in unison for effective Disaster Risk Management Services.

For this reason, a detailed discussion of some important concepts of the proposed model such as Operations Management, Disaster Risk Assessment, and Hazards Analysis are presented in Chapter 4 of this study.

7.2.3 Step Three

The third step was to develop an approach to conduct the empirical study that focused on the methodology, design and instrumentation. Since Disaster Risk Management is a multisectoral, multidimensional field of study, neither the qualitative nor the quantitative approach would capture the depth and breadth of Disaster Risk Management as a service delivery imperative accurately. Therefore, a mixed approach was preferred for this study to capitalise on the strengths and to complement each approach. The result was a rich blend, which ensured that the findings were consistent, allowed for applicability and emphasised the truth (Harwell, 2011:151).

Furthermore, for the empirical study, a structured questionnaire was used for quantitative data collection and a semi-structured interview schedule (qualitative) was used for the focus group interviews. To ensure credibility of both these instruments, advice and inputs from five subject matter experts from three different universities were sought. Thereafter, suggestions and recommendations from the supervisor of this research were factored into the structured questionnaire and the semi-structured interview schedule.

The final instrument was developed with the support of an information technology specialist for the design and layout of the structured questionnaire. Using the QuestionPro programme, the self-administered structured questionnaire was mailed electronically to respondents of the various Free State Municipalities. This QuestionPro programme was used because it is designed to monitor the commencement and completion of the structured questionnaires. In this way, "real-time" statistics were obtained to follow up with reminders to those who agreed to participate but did not.

After about two months, a response rate of 64% was achieved and the quantitative data collection was stopped. The structured questionnaire also contained two open-ended questions requiring the respondents to share their views on whether an integrated Disaster Risk Management Model could improve the Disaster Risk Management Services in their municipalities. The qualitative responses were then, compared to the quantitative data. The findings overwhelmingly supported the use of the proposed integrated Disaster Risk Management model to improve the understanding of the main concepts of Disaster Risk Management. If implemented appropriately, the proposed integrated Disaster Risk Management Model should assist municipalities in improving their Disaster Risk Management Services.

7.2.4 Step Four

The fourth step concentrated on the results and findings of the empirical research, as well as the interpretation and recommendations for effective Disaster Risk Management in the Free State Municipalities. Firstly, the objectives were stated, followed by a description of the respondents and the computer-aided programmes that were used in this study. An experienced statistician used three computer-aided programmes, namely The Statistical Package for Social Sciences (SPSS), The Atlas Ti and QuestionPro for analysing the data. Thereafter, the statistical analysis was reviewed by a senior member of the SABS TC 169 committee of the South African Bureau of Standards. Furthermore, this reviewer represents the Republic of South Africa (RSA) in ISO TC 69: Application of Statistical Methods, and the convenor of ISO TC 69 (Subcommittee 1, Working Group 2). The findings were then, presented in Chapter 6 of this study.

The empirical study focused on using the triangulated method, which assigned quantitative and qualitative data the same priority for examination and analysis.

7.2.5 Step Five

The last step (Step 5) was to make sense of the findings of the study by drawing conclusions and making recommendations. This was done by crosschecking in which chapter the research questions were answered to achieve the sub-objectives and ultimately to what extent the main objective was achieved. One of the most significant findings to emerge from this study is that there must be a common understanding of the most relevant concepts for effective Disaster Risk Management. This is supported by the Sendai Framework of 2015. For this reason, the proposed integrated Disaster Risk Management Model will provide for a common understanding of the most important concepts of Disaster Risk Management and, consequently, the importance of Disaster Risk Management as a service-delivery imperative will be recognised by all stakeholders. In this way, political support may be secured for adequate skilled staff, sufficient funding and emergency equipment to minimise disaster risks, safeguard sustainable development and subsequently reduce poverty levels.

The last step in the research process is demonstrated in Table 7.1 in which the research questions are answered to achieve the secondary objectives. Ultimately, all secondary objectives were attained, leading to the achievement of the main objective of this study.

7.3 REVIEW OF CHAPTERS

The aim of the study was to contribute positively to the improvement of Disaster Risk Management within municipalities in the Free State Province by developing an integrated Disaster Risk Management Model that would assist municipalities in the Free State Province to plan, implement and manage disasters risks effectively.

To achieve its aim, this study comprises seven chapters, which are summarised as follows:

7.3.1 Chapter One

This chapter provided an indication of how the study was conducted. Firstly, it introduced the research topic, provided a brief background to Disaster Risk Management and motivated the importance of the study.

Secondly, the problem statement of the study was defined and the research objectives and research questions were clearly stated. This was followed by a concise discussion of the research methodology, ethical considerations and justification for the study.

Thirdly, the Main Disaster Risk Management concepts that were used to develop the proposed integrated Disaster Risk Management Model were discussed. This was to provide a better understanding of Disaster Risk Management as a service-delivery imperative.

7.3.2 Chapter Two

Chapter 2 of this study serves as the theoretical review of the Disaster Risk Management. The international, national and South African perspectives on Disaster Risk Management and related legislation were discussed. This included the relevant Disaster Risk Management concepts and previous similar studies. This chapter also highlighted the emergence and reforms of Disaster Risk Management in South Africa. The key concepts of Disaster Risk Management were defined and discussed with an emphasis on Disaster Risk Management rather than Disaster Management as expressed in the Sendai Framework (2015).

The development of national and international regulatory framework on Disaster Risk Management in South Africa were highlighted, followed by an in-depth discussion on structures and institutional arrangements for Disaster Risk Management in South Africa. In particular, the four Key Performance Areas: Integrated institutional capacity for Disaster Risk Management, Disaster Risk Assessment, Disaster Risk Reduction and Disaster Risk Response and Recovery advocated by the NDMF (2005) were deliberated in detail. The discussion included the following three enablers: Information Management and Communication, Education, Training, Public Awareness and Research, and Funding Arrangements for Disaster Risk Management.

The disaster risks that South Africa is prone to is exacerbated by the emerging influence of climate change on the country, and is highlighted in Chapter 2 of this study. The National Climate Change Response White Paper (2011:8) stresses that the past decade was known as the hottest on record, due to rapid increases in average temperatures throughout the world. This also had an influence on the South African climate. Thus, climate change contributes to unexpected disastrous events such as floods, severe storms leading to urban flooding, droughts and water shortages, urban and veld fires, dam failures, mining induced earthquakes, sinkholes, epidemics, spillages of hazardous waste and even acid mine drainage in South Africa.

According to Chapter 5 of The National Development Plan 2030, South Africa needs to strengthen the resilience of its communities by promoting a low-carbon economy, which is environmentally sustainable and equitable. For this reason, the roles and responsibilities of the various spheres of government and other role-players emphasise a community-based disaster risk-reduction approach within the context of a municipality's integrated development planning. It is also argued that in terms of Section 16 of the MSA (2000), the local community must take part in the preparation, the implementation and review of the municipalities Integrated Development Plans (IDPs) from which the Disaster Risk Management plans cannot be excluded.

7.3.3 Chapter Three

This chapter focused mainly on Disaster Risk Management in the South African context. The functioning of DRM in the CoCT Metropolitan Municipality, The Ekurhuleni Metropolitan Municipality and the Mangaung Metropolitan Municipality, which represent the larger municipalities in South Africa were analysed.

The CoCT Metropolitan Municipality was selected because of its coastal location and frequent flood and fire disasters. The Ekurhuleni Metropolitan Municipality was selected because it is an aerotropolis, surrounded by a network of rail and road infrastructure. It is also comparable to some of the smaller countries in Africa; should a disaster strike, the impact on people and infrastructure will be catastrophic. The Mangaung Metropolitan was selected for this study, because it is one of the smaller metropolitan municipalities, which is highly prone to a major disaster such as an earthquake. It is less dense with people and infrastructure and a Disaster Risk

Management Model can be implemented easily and modified, using the trial-and-error method.

For this reason, an in-depth study was conducted in the Free State Province to establish the state of readiness of the municipalities to render effective Disaster Risk Management Services. The study also looked at the financial implications of disasters in the Free State Province.

Chapter 3 also highlights the *Disaster Management Amendment Act, 2015*, which makes provision in Section 21 for each municipality to conduct a disaster risk assessment for its municipality to identify and map the risk, the areas, the ecosystems, including the communities and households that are exposed or that are vulnerable to physical and human-induced threats. Thus, the Department of Cooperative Governance and Traditional Affairs (COGTA) made it clear that it would support provinces, municipalities and other organs of state in line with the *Disaster Management Amendment Act, 2015.* However, serious challenges still exist in the Free State Province (Parliamentary Report: September, 2015).

The Free State Annual Report Disaster Risk Management (2016:15) lists three main challenges, namely Financial Resources, Human Capital and Facility Resources. Firstly, according to the Free State Annual Disaster Risk Management Report, it is grossly underfunded in terms of finances; secondly, it does not have the required number of skilled staff; and thirdly, it does not have a centre equipped with an effective communication system. In addition, the district and local municipalities also do not have sufficient capacity to render effective Disaster Risk Management services. The Provincial Disaster Risk Management Centre also lacks the capacity to train and capacitate officials from sectoral departments, another major setback for effective Disaster Risk Management Services in the Free State Province.

Furthermore, Chapter 3 stresses the importance of the Free State Provincial Disaster Management Centre to provide support to its Metropolitan Municipality, 4 district municipalities, 19 local municipalities and over 20 sectoral departments and organisations. However, it does not have the required human, financial and equipment capacity to fulfil this obligation, which further adds to the dilemma regarding Disaster

Risk Management Services in the Free State Province (PDMC Annual Report, 2016:15).

For this reason, the Free State Province and the Department of Cooperative Governance and Traditional Affairs (COGTA) established an Assessment Commission to determine the extent to which Disaster Risk Management and Fire Management services in the Free State Province have been functioning as a single unit. The commission found that several municipalities where experiencing severe challenges such as Disaster Risk Management Services are perceived to be the competency of the District Municipality. Thus, they do not even budget for Disaster Risk Management and the procurement of goods for disaster-affected communities are seen as disaster risk contingency plans.

However, the integration of Disaster Risk Management activities into the Integrated Development Plan (IDP) is conducted by the IDP Managers who have little knowledge of Disaster Risk Management as a function. Hence, the Provincial Disaster Management Centre (PDMC) and the South African Local Government Association (SALGA) have agreed to support municipalities to build the Disaster Risk Management capacity within their institutions (IDP Annual Report, 2017).

Not all municipalities are faced with the same threats; for example, urban populations may be faced with urban flooding due to inappropriate and inadequate storm-water drainage systems, compared to rural municipalities, which may be confronted by riverine flooding. For this reason, municipalities may employ various unique methods to conduct their disaster risk assessments.

In addition, the social, physical and human vulnerabilities may vary from province to province and from municipality to municipality. Notwithstanding these differences, all capable municipalities are required by law to develop a plan that serves as a blueprint for Disaster Risk Management within its jurisdiction. Similarly, not all municipalities function at the same level. According to the available resources, experience and expertise at metropolitan, district and at local municipalities, the DRM plans may be functioning at either level 1, 2 or level 3. Thus, municipalities functioning at the highest level of planning ought to have developed a level-3 plan.

Inasmuch as the plans of the different municipalities differ according to the threats, they are confronted with and resources available to them, all municipalities must adhere to the minimum legislative requirements for effective Disaster Risk Management Services. For this reason, the comparative analysis of the CoCT Metropolitan Municipality (CoCT) in the Western Cape, the Ekurhuleni Metropolitan Municipality in the Gauteng Province and the Mangaung Metropolitan Municipality in the Free State Province were conducted. The findings of this comparative study are elaborated in Chapter 3 of this study.

7.3.4 Chapter Four

The proposed integrated Disaster Risk Management model that this study refers to is discussed in detail in Chapter 4 and Chapter 7 of this study. It highlights the importance of an integrated Disaster Risk Management Model that will facilitate the development and implementation of strategic Disaster Risk Management policies and decisions. The technical elements of the proposed integrated Disaster Risk Management Model will also promote a common understanding of the basic tenets of Disaster Risk Management as a service-delivery imperative. A common understanding of these concepts will go a long way towards the provision of a unified Disaster Risk Management Service in the Free State Province.

Chapter 4 also provides various definitions of models and viewpoints on International Frameworks concerning Human Rights, Disaster Risk Management, Disaster Risk Reduction and International Strategies for Disaster Risk Management and Climate Change. The discussion on International frameworks concerning human rights and Disaster Risk Management stresses the relationship with the United Nations Commission on Human Rights (UNCHR) and the African Union (AU) Report on Disaster Risk Reduction. It also highlights how these rights have an impact on Chapter 2 of the Bill of Rights of the *Constitution*, *1996,* the United Nations International Strategy for Disaster Reduction (UNISDR) and other international treaties concerning climate change.

7.3.4.1 Purpose of Disaster Risk Management models

In Chapter 4, the discussion on models reveals the relationship that exists amongst the different elements that connect them. Importantly, these relationships have the potential to influence the development of management theories in the Disaster Risk Management discipline. Thus, evolving theories may lead to the refinement of past and current models, which may lead to the development of alternative ones to create new knowledge.

The proposed integrated Disaster Risk Management Model of this study will make it easier to develop and implement strategic policy decisions. Pine (2015:60) stresses the importance of having a common understanding of the key concepts of Disaster Risk Management to appreciate how Disaster Risk Management Models function. A unified response to disasters will minimise large-scale social and economic losses (Pine, 2015:60).

7.3.4.2 Benefits of Disaster Risk Management models

Chapter 4 discusses the benefits of integrated Disaster Risk Management models, especially in South Africa where municipalities are faced with insufficient skilled human and other essential resources. However, the most important benefits of an integrated Disaster Risk Management Model are that it helps in counting and measuring the impact of disasters. Another benefit is that they also assist to describe the disaster risk events as they unfold in the various phases of a crisis management (Pine, 2015:60; Kelly, 1998, in Asghar *et al*., 2011: 25; White, 2013; Van Niekerk, 2008).

7.3.4.3 Challenges of Disaster Risk Management models

Some of the main challenges that Disaster Risk Management models may present are insufficient community participation in the development of Disaster Risk Management Models, minimising the importance of Disaster Risk Management by municipalities and sectoral departments and the lack of political commitment and support for Disaster Risk Management by politicians and senior management.

7.3.4.4 Limitations of Disaster Risk Management models

These limitations have been highlighted in Chapter 4 of this study.

In most of the Disaster Risk Management Models, not all the major components of Disaster Risk Management are included within its framework. For example, climate change as important environmental component that affects the severity and intensity of disasters is not included in most models. Additionally, Disaster Risk Management Models only include Prevention, Mitigation, Response and Recovery as their main phases and disregard evaluation and analysis, which are key components of mitigation strategies for future disasters. Since the activities in Disaster Risk Management Models are not organised in a logical order, the full picture of Disaster Risk Management is not captured.

7.3.4.5 Categories of Disaster Risk Management models

Models are made up of different elements: benefits, characteristics and limitations. For this reason, they have been grouped into four different categories, namely Logical models, Integrated models, Cause models and Other models. The important aspects of these models, which also present the key elements of the proposed Disaster Risk Management model, are discussed in detail in Chapter 4 of this study,

7.3.4.6 Main elements of Disaster Risk Management models

The proposed integrated Disaster Risk Management Model was developed after conducting an extensive comparative analysis of over 30 international and 10 South African models and frameworks. Thereafter, the characteristics of all models provided for by the NDMF (2005) were analysed to ensure that the proposed integrated model complies with the requirements of DMA (2002) as well as the NDMF (2005).

Chapter 4 of this study highlighted the three main elements, Operations Management, Hazard Analysis and Risk Management, which were determined to be the most important in the development of the proposed integrated DRM model.

Furthermore, the functioning of these elements are discussed extensively in Chapter 4, section 4.13 of this study. According to Table 4.10 in Chapter 4 of this study, the

main elements for the development of the proposed integrated Disaster Risk Management Model is Operations Management (Table 4.10, Ref. 1, 2, 3, 4, 7); Hazard Analysis (Table 4.10, Ref 2, 3, 5, 6, 7); and Risk Management (Table 4.10, Ref 2, 3, 4, 7 and Ref. 2, 4, 5, 6, 7). The numbers indicate which models the South African NDMF (2005) are suggested as a guiding framework for municipalities in South Africa to use. The next step was to check which aspects of the models might be achieved using the Key Performance Areas as well as the enablers as reflected in the NDMF (2005). Thereafter, the aspects that may be achieved by a specific enabler and key performance area were grouped together. It was then established that three of the elements: Operations Management, Hazard Analysis and Risk Management, which include most of the important aspects of Disaster Risk Management are sufficient to develop a comprehensive and integrated Disaster Risk Management model.

- **Operations Management:** Refers to a comprehensive set of activities (Preparedness, Prevention, Mitigation, Response and Recovery) that must be undertaken by a municipality to offer an acceptable level of Disaster Risk Management services accordance with the DMA (2002).
- **Hazard Analysis**: Refers to a comprehensive community based approach used to identify the specific hazards that is prevalent in the community, to conduct a vulnerability Analysis and then conduct a Disaster Risk Analysis.
- **Risk Management:** Refers to identifying specific disaster risks, Analysing the Disaster Risk, Evaluating the Disaster Risk and finally, Treating the Risk.

The proposed integrated Disaster Risk Management model, which is based on the Cunny Comprehensive Model, may also include the environment, monitoring and evaluation as additional elements.

7.3.5 Chapter Five

This chapter presents the research methodology, research design, research philosophy and the research strategy to collect data. The chapter further explains the research process that was followed to achieve the aim and objectives. This is followed by a discussion about the research population and sampling methods, the research instrument, data collection, data analysis and triangulation. A comparative analysis of the quantitative and qualitative approaches is discussed to demonstrate the

usefulness of both approaches for this study. For this study, the pragmatic paradigm, which focuses on a mixed research method and modes of analysis used.

The study was mainly informed by the pragmatic paradigm, which included some aspects of the positivist paradigm (quantitative), supported by the post-positivistic paradigm or interpretivism paradigm (qualitative). The post-positivistic paradigm validated the gaps generated by the positivistic analysis to verify the depth of the identified factors.

7.3.6 Chapter Six

In Chapter 6, the framework for data analysis is presented to establish the extent to which the aim of the study was achieved. This chapter presents the results of the empirical research, and discusses the findings and interpretations in order to make recommendations. It was found that 53% of the provincial respondents are of the opinion that the PDMF is good, while only 6% indicated poor and very poor, respectively. By contrast, 50% of the metropolitan respondents were of the opinion that the Metropolitan Disaster Management Framework was good, while 17% of the respondents were of the opinion that it was poor and another 17% of the respondents are of the opinion that it was very poor, while another 17% had no opinion. 58% of the district respondents were of the opinion that the District Disaster Risk Management Framework was good, while 17% were of the opinion that it was poor, while only 8% said very poor and 17% of the district respondents had no opinion. However, 36% of the district metropolitan respondents had no opinion on the PDMF. This is a major concern, because in terms of Chapter 5, Part 1, Section 42(3) of the DMA (2002), the PDMF must be used as a guiding document on which the District Disaster Risk Management Framework is based.

The majority of the respondents rated the PDMAF as good and very good. Seventeen percent of the provincial respondents indicated that it was functioning as poor. Only 6% indicated that the PDMAF was functioning as very poor, while 17% of the respondents did not know. The latter two percentages are of concern and therefore one could argue that these respondents are uninformed about the performance of the PDMAF, or even unaware that such a forum exists. However, 20% of the metropolitan respondents indicated that the Metropolitan Disaster Management Advisory Forum

(MDMAF) was functioning well; another 20% of the respondents replied that the MDMAF was functioning poor; and yet another 20% of the respondents replied that it functioned as very poor. What is of concern is that 40% of the respondents did not know how the MDMAF functioned. A possible reason for this is that the majority of the metropolitan respondents are unaware of the MDMAF performance.

Chapter 2 of this study emphasises that in terms of the DMA (2002), a PDMAF must be established in each province, and must function within the ambit of the Provincial Disaster Management Centre. However, what is of concern is that 17% of the provincial respondents were unaware how well the PDMAF is functioning. The DMA (2002) does not make provision for local municipalities (district and metropolitan municipalities) to establish a forum or an institutional and/or interdepartmental governing structure. However, Chapter 2 of this study emphasises that local municipalities are at the forefront of the institutions that provide Disaster Risk Management Services to any community.

For this reason, Chapter 2 of this study is in line with the NDMF (2005:34-35), which stresses that metropolitan and district municipalities must use their discretionary powers to establish a forum such as the Municipal Disaster Management Advisory Forum (MDMAF), although it is not prescribed by the DMA (2002).

This study found that 40% of the metropolitan respondents indicated that they did not know how well the Metropolitan Disaster Management Advisory Forum performed, which is a concern. The Provincial Disaster Management Centre of every province is the link between the National Disaster Management Centre and the various metropolitan, district and local Disaster Management Centres within a province and it is supposed to play a supportive oversight role. However, the empirical findings indicate that 45% of the respondents stated that the Provincial Disaster Management Centre did not comply with the requirements of the DMA (2002) and the NDMF (2005).

According to the empirical findings of this study, the majority of the respondents (50%) agreed that the Provincial Disaster Management Centre complied with the requirements of the *Constitution, 1996*, while 30% disagreed and 20% were neutral. What is clearly noticeable is that the majority (57%) of the respondents disagreed that the Mangaung Metropolitan Disaster Risk Management Centre complied with the

requirements of the DMA (2002), while only 14% of the respondents were neutral and 29% agreed that it complied with the DMA (2002). As indicated above, it is a concern that the majority of the respondents disagreed that the Mangaung Metropolitan Disaster Risk Management Centre complied with the requirements of the DMA (2002).

Chapter 3.5.9 illustrates the state of the provincial, metropolitan, district and local municipalities to render effective Disaster Risk Management Services. The findings reveal that the Disaster Risk Management Services provided are not of an adequate level. Furthermore, it is evident from the literature reviewed and the empirical studies conducted that there is a real need for a common understanding of the basic tenets of Disaster Risk Management, especially the concepts (NDMF, 2005:2-148). This would be in keeping with the second key performance area of the NDMF (2005), which is to establish a uniform approach to assessing and monitoring disaster risks in South Africa. It is for this reason that this study proposes an integrated Disaster Risk Management Model (NDMF, 2005:2-148).

7.3.7 Chapter Seven

The last chapter of this study discusses the five-step research process followed by this study to show how the aim of the study was achieved. The aim of the study was to contribute positively to the improvement of Disaster Risk Management within municipalities in the Free State Province by developing a proposed integrated Disaster Risk Management Model that would assist municipalities in the Free State Province to plan, implement and manage disaster risks effectively. The functioning of the proposed integrated Disaster Risk Management Model is also discussed in Chapter 7

Thus, section 7.4 of this chapter highlights the chapter in which the research questions were answered to achieve the objectives of this study. In Chapter 2, some of the most notable legislative frameworks for Disaster Risk Management such as the *Constitution, 1996*, MSA (2000), DMA (2002), and the NDMF (2005) are discussed. The international frameworks discussed are the International Strategy for Disaster Risk Reduction (UNISDRR), The Hyogo Framework for Action (HFA) (2005) and The Sendai Framework for Disaster Risk Reduction (2015-2030). The functioning of all municipalities in the Free State Province was also discussed in detail. In addition, the functioning of DRM in the Mangaung Metropolitan Municipality was compared to the

functioning of DRM in the CoCT Metropolitan Municipality and the Ekurhuleni Metropolitan Municipality.

7.4 RESEARCH AIMS AND OBJECTIVES

This section emphasises how the aim and objectives of the study were achieved. Based on literature analysis and empirical studies, the aim of the study is to contribute positively to the improvement of Disaster Risk Management within municipalities in the Free State Province by developing the proposed integrated Disaster Risk Management Model that should assist municipalities in the Free State Province in planning, implementing and managing disasters risks effectively.

Table 7.1 below demonstrates the chapter in which each research question was answered to achieve specific objectives, which eventually led to the achievement of the aim of the study.

Table 7.1 Aim and objectives, chapters and research questions of this study

The aim of the study is to contribute positively to the improvement of Disaster Risk Management within municipalities in the Free State Province by developing an integrated Disaster Risk Management model that should assist municipalities in the Free State Province to plan, implement and manage disasters risks effectively.		
Research Objectives (RO)	**Ref**	**Research Question**
RO 1. To investigate the statutory legislative policy guidelines and frameworks, government reports and documents, international and local models, principles and requirements of Disaster Risk Management, disaster response, recovery, mitigation, risk reduction, prevention and disaster risk preparedness	Ch. 2 Ch. 3 Ch. 4 Ch. 6	1. What aspects should be included in an integrated Disaster Risk Management model for the Free State municipalities, based on literature analysis and empirical study? 2. What do the literature, statutory frameworks, policy documents, international and local Disaster Risk Management models emphasise concerning the guidelines, principles and requirements of Disaster Risk Management, disaster response, recovery, mitigation, risk reduction, prevention and disaster risk preparedness?

RO 2. To evaluate the current disaster risk mitigation measures that are being used in the Free State municipalities	Ch. 2 Ch. 3 Ch. 4	2. What do the literature, statutory frameworks, policy documents, international and local Disaster Risk Management models emphasise concerning the guidelines, principles and requirements of Disaster Risk? Management, disaster response, recovery, mitigation, risk reduction, prevention and disaster risk preparedness. What current disaster risk-mitigation measures are used in the Free State province? What is the socio-economic cost pertaining to Disaster Risk Management in the Free State Municipalities?
RO 3. To investigate the current profile of the officials who implement Disaster Risk Management in the Free State Municipalities	Ch. 6	What is the profile of the Disaster Risk Management officials in the Free State Province?
RO 4. To investigate the current state of Disaster Risk Management in the Free State Municipalities	Ch. 2 Ch. 3 Ch. 6	What aspects should be included in an integrated Disaster Risk Management model for the Free State municipalities, based on literature analysis and empirical study?
RO 5. To investigate the functioning of Disaster Risk Management amongst three Metropolitan Municipalities: The City of Cape Town Metropolitan Municipality in the Western Cape Province, the Ekurhuleni Metropolitan Municipality in the Gauteng Province and the Mangaung Metropolitan Municipality of the Free State Province	Ch. 4 Ch. 6	What is the current state of Disaster Risk Management in Free State municipalities?
RO 6. To make specific Disaster Risk Management recommendations based on research findings with a view to improving Disaster Risk Management in the Free State Municipalities	Ch. 7	What specific recommendations, based on research findings, could be made with the view of improving disaster risks management services in the Free State Municipalities?

(Source: Researcher's own interpretation, 2017)

In Table 7.1 above, the first column indicates the research objectives. The second column indicates the chapters in which the research objectives have been achieved.

The last column shows the research questions that were answered to achieve the objectives.

The aim of the study is to contribute positively to the improvement of Disaster Risk Management within municipalities in the Free State Province by developing an integrated Disaster Risk Management Model that could assist municipalities in the Free State Province to plan, implement and manage disasters risks effectively. In achieving the aim of this study, the next section summarises the research findings by indicating the chapter in which the six research objectives of this study were achieved.

7.5 RESEARCH FINDINGS

The next section elaborates what Table 7.1 presents and indicates the specific chapters of the study where the Research Objectives (RO) that were achieved could be found. Furthermore, a detailed discussion and analysis of the research aim, which was realised by fulfilling the following six research objectives as presented in Chapter 4 of this study. The ensuing discussion presents how and in which chapter the six objectives of this study were achieved.

7.5.1 Research Objective 1 (RO1)

This objective was achieved by conducting an extensive literature review, which is presented in Chapter 2 of the study. Some of the important features covered by this literature review include the Emergence and Reforms of Disaster Risk Management; Disaster Risk Profile of South Africa; Disaster Risk Management Concepts; International and National Statutory and Regulatory Frameworks regarding Disaster Risk Management; and models and frameworks provide enough depth and breadth to establish what important aspects are relevant for the development of the proposed integrated Disaster Risk Management model for the Free State Municipalities.

7.5.1.1 Emergence and reforms of Disaster Risk Management in South Africa

Chapter 2.2 commences with the emergence of reforms in Disaster Risk Management in South Africa, which could be traced as far back as the 1940s. Some of these are The Council for Civil Defence Services of the 1959, The Directorate for Civil Defence of 1962, *The Civil Protection Act of 1977*, the *Disaster Management Bills of 2000 and*

2001 and the more recent DMA (2002) and the NDMF (2005). The DMA (2002), advocates that the management of disaster risks must be integrated, multisectoral and multidimensional. For this reason, the DMA (2002), supported by the NDMF (2005,) makes provision for all municipalities to plan and prepare for Disaster Risk Management as a service-delivery imperative.

Chapter 2 supports the fact that South Africa has made tremendous strides since the *Civil Defence and Civil Protection Acts of the 1940s, 1950s and 1960s*, to the adoption of internationally recognised legislation post-1994. Since the adoption of the DMA (2002) and the NDMF (2005), South Africa has established itself as one of the first African countries to legislate Disaster Risk Management comprehensively. Furthermore, the findings of this study show that these legislations are of international standing, since they are closely aligned to the Hyogo Framework for Action (2005-2015) and the Sendai Framework (2015-2030). Furthermore, Chapter 4 (Table 4.10) and the Key Performance Areas 2, 3, 4 with reference 2, 3, 4, 5, 6 and 7 prove that Disaster Risk Assessment, Hazard Analysis, Disaster Risk Prevention, Disaster Risk Response and Disaster Recovery are very important concepts. For this reason, all Disaster Risk Management officials must have a common understanding of these concepts, which feature prominently as key elements of the proposed integrated DRM model.

7.5.1.2 Disaster Risk Profile of South Africa

Chapter 2.3 of this study describes the disaster risk profile of South Africa, which is affected by large-scale natural and human-induced disasters such as floods, fires and droughts, amongst others. In addition, Chapter 3 reflects a comprehensive list of hazards, which are the main causes of disasters that affect the CoCT Metropolitan Municipality, the Ekurhuleni Metropolitan Municipality and the Mangaung Metropolitan Municipality.

Chapter 3 further highlights the most common challenges experienced by these three metropolitan municipalities as indicated above regarding Disaster Risk Management. The local and district municipalities in the Free State Province were also studied in greater depth for the purposes of this study, as indicated in Chapter 3.

Large sums of money were spent on disaster risk reduction in these municipalities. For example, in the 2015/16 financial year alone, disasters cost the country an estimated R317 947 000. Of the three metropolitan municipalities discussed in Chapter 3, the establishment of the Mangaung Metropolitan Disaster Centre and the Free State Provincial Disaster Management Centres are recent developments, which require much more financial, staffing and equipment-related support. The empirical evidence suggests that the Free State Provincial Disaster Management Centre, as well as the Mangaung Metropolitan Municipality does not function as effectively as the other two metropolitan municipalities. Lack of funding, insufficient staffing capacity, ineffective communication systems and ill-prepared sectoral departments regarding Disaster Risk Management are the main challenges confronting the Free State Province.

For instance, senior officials of the Mangaung Metropolitan Disaster Management Centre and the Free State Provincial Disaster Risk Management Centre have backgrounds in Fire and Emergency Management Services, respectively. However, it is important that all stakeholders possess expertise in key Disaster Risk Management concepts and principles, especially for the effective planning and coordination of a multisectoral, multidimensional and technical field such as Disaster Risk Management. Thus, the lack of effective DRM planning leading to the dysfunctional Disaster Risk Management systems in the Free State Province is evidenced by the lack of appropriate capacity.

In addition, the National Climate Change Response White Paper (2011:5) states that climate change is a reality and developing countries such as South Africa are subjected to the effects of widespread weather-related disasters. For this reason, the Free State Province has been experiencing severe, extreme weather events such as droughts and floods. Furthermore, because of its geographical position and social, economic and environmental conditions, the Free State Province is exposed to the impact of El Nino and La Nina events. These weather patterns have caused severe droughts and floods, affecting the agricultural, mining, electricity generation sector as well as the environment with a notable impact on the economy of the Free State Province. Chapter 3 of this study discusses the inappropriate DRM planning, which

has led to excessive funding costs because of dysfunctional DRM systems in the Free State Province.

From the above discussion, one can deduce that South Africa, and in particular the Free State Province, has not made adequate arrangements to protect itself from untold harm and misery which may be caused by natural disasters risks. The findings clearly show that there is an increase in the number of disaster events leading to human suffering of huge proportions and costing the economy many millions of rands. This excessive money could be spent better on preventative measures that would cost far less.

The management of disaster risks is of paramount importance and to reduce disaster risks, there must be a common understanding of the main concepts of Disaster Risk Management. An accredited training programme of at least up to a higher certificate level on the National Qualification Framework is suggested. The proposed integrated Disaster Risk Management model could be used as an instrument to train and develop DRM officials in the Free State Province. This will ensure a common understanding of the key elements of the model. It will also clarify the roles and responsibilities of DRM and consequently lead to effective disaster risk management.

7.5.1.3 Disaster Risk Management key concepts

Chapter 2.5 presents a discussion of the more important concepts for which there must be a common understanding of Disaster Risk Management. Disaster Risk Management, Disaster Risk Reduction, Disaster Response and Recovery, Disaster Risk Assessment, Disaster Risk Mitigation, Vulnerability and vulnerability Assessments are some of the key concepts that are important for the development of the proposed integrated Disaster Risk Management model.

After extensive studies, it was concluded that the sub-elements stated above might be grouped under one of the following main elements: Operations Management, Hazard Analysis and Risk Management, which is discussed in detail in Chapter 4 of this study. The importance of these three elements cannot be minimised, since they form the core elements of the proposed integrated DRM model for this study.

In this respect, the Disaster Management Amendment Act, 2015 makes provision for local municipalities to develop capacity for the establishment of a Disaster Management Centre in consultation with the relevant district municipality. However, lack of adequate skills and knowledge, lack of sufficient funding and equipment poses a serious threat for effective Disaster Risk Management. For this reason, a much more concerted effort is required from all role-players to ensure that adequate training and development, funding and equipment are prioritised in the face of competing interests such as poverty alleviation, healthcare and education.

In addition, a deliberate attempt must be made by academics and researchers to develop accredited training programmes for all officials to have a common understanding of the main concepts, namely Operations Management, Hazard Analysis and Risk Management. This understanding will also clarify roles and responsibilities of Disaster Risk Management officials. A detailed description of these core concepts, which are important elements necessary for the development of the proposed DRM model, are presented in Chapter 4 of this study

In support of this argument, Chapter 2 as well as Chapter 4: Key Performance Areas 2, 3 and 4 and Operations Management – Planning operations with reference 1, 2, 3, 4, 5, 6 and 7 prove that these are very important concepts for the development of the proposed integrated DRM model. For this reason, the key concepts are presented as critical elements of the proposed integrated Disaster Risk Management model.

7.5.1.4 International and National Statutory and Regulatory Frameworks regarding Disaster Risk Management

Extensive literature reviews (Chapter 2, 3, 4) and the empirical study (Chapter 6) was carried out and Table 7.2 below provides a breakdown of the national and international statutory and regulatory frameworks, strategies, structures, conventions and protocols concerning Disaster Risk Management and disaster risk reduction that were studied before developing the proposed integrated DRM model. The purpose was to consult as extensively as possible to establish firstly, which important elements are currently used for successful Disaster Risk Management Services. The second aspect was to determine the best way to organise these core elements so that the proposed DRM model would be very effective if used correctly.

Table 7.2 below shows the various structures and legislation that was consulted to establish which would be the most appropriate elements for developing the proposed integrated Disaster Risk Management model.

Table 7.2 Legislative frameworks consulted

Legislation, Institutions and Models	**No**
Four categories of international models	33
South African models (NDMF 2005)	10
International Disaster Risk Management frameworks	2
National Disaster Risk Management Acts and frameworks	3
International Commissions and Strategies	4
International Protocols and Conventions	3
Disaster Risk Management structures, forums and committees	30
Statutory legislative policy guidelines and frameworks	12
Government departments	12
Total	**109**

(Source: Researcher's own interpretation)

The first column in Table 7.2 above refers to the Legislation, Institution models, Frameworks, Protocols and Conventions that were studied to establish the most important elements that should make up an integrated Disaster Risk Management model. The next column indicates the number of the legislations, frameworks, models or conventions that were analysed to establish the validity of the elements used to develop the proposed integrated Disaster Risk Management model.

As indicated by Table 7.2 above, more than 66 international, national and local statutory and regulatory frameworks, strategies, conventions, protocols and structures concerning Disaster Risk Management and disaster risk reduction were consulted to get an in-depth understanding of the requirements for the effective functioning of Disaster Risk Management (Table 7.2). In addition, over 40 international and national models and frameworks (Refer to Chapter 4) were studied, which provided enough evidence to support the usage of the three main elements that the proposed integrated Disaster Risk Management model offers.

After an extensive and exhaustive study as indicated by Table 7.2 above, three elements, namely Operations Management, Risk Analysis and Risk Management were identified as critical for the development of the proposed integrated DRM model.

If there is a common understanding of these three elements, namely Operations Management, Risk Analysis and Risk Management, it will go a long way towards improving the Disaster Risk Management services in the Free State Province and indeed in South Africa. The analysis of the findings of the empirical study also supports the notion of using the proposed integrated Disaster Risk Management model for a better understanding of the functioning of Disaster Risk Management at local, district and provincial level (Refer to Chapter 6).

South Africa has made tremendous strides in developing legislative frameworks from a reactive civil protection, response and recovery approach to a more comprehensive, proactive Disaster Risk Management method that is presented in Chapter 2 of this study. Inasmuch as these legislations are highly rated internationally, many of the municipalities in South Africa are inundated with Disaster Risk Management implementation challenges because of skills shortages, lack of funding and insufficient equipment. For these reasons, there is no guarantee that the proposed integrated Disaster Risks Management model will be effective with sufficient resources alone. Thus, the proposed integrated Disaster Risk Management model assigns specific roles and responsibilities to Disaster Risk Management officials for which they must be responsible and held accountable.

7.5.1.5 Models and frameworks

Chapter 3 argues that there is sufficient information regarding Disaster Risk Management. However, only a limited number of instruments are available to assist municipalities with the implementation thereof, especially in the municipalities of South Africa. Therefore, this study has proposed an integrated Disaster Risk Management model, which, if implemented appropriately, will go a long way towards supporting the South Government from breaching national and international legal prescripts, as was demonstrated by the Budayeva and others versus the Russian Government in 2008.

In Chapter 4, over 40 national and international legislative frameworks and Disaster Risk Management models were studied and analysed. Overwhelming evidence shows that all the sub-elements may be rearranged to form three core elements, namely Operations Management, Hazard Analysis and Disaster Risk Management. These elements form the core of the proposed integrated Disaster Risk Management model.

The aim of this study is to contribute positively to the improvement of Disaster Risk Management within municipalities in the Free State Province by developing an integrated Disaster Risk Management model, which should assist municipalities in the Free State Province to plan, implement and manage disasters risks effectively. For this reason, it is imperative that all Disaster Risk Management staff have a common understanding of the core elements of the proposed integrated DRM model to function effectively as a unit. All Disaster Risk Management officials must precisely know the requirements and principles for effective functioning of the various elements and together they must constitute an effective functioning DRM system. In short, everybody must do exactly what must be done and effectively for the models to work successfully. The proposed integrated Disaster Risk Management model displays only the most salient elements, making it easier to understand how this specific proposed integrated Disaster Risk Management model should work (Chapter 4).

7.5.2 Research Objective 2 (RO2)

To evaluate the current disaster-risk mitigation measures that are used in the Free State municipalities (Research Questions 3 and 4).

In the operations management context, prevention refers to some specific activities such as mitigation, preparedness, response and recovery. Thus, some mitigation initiatives undertaken by municipalities are the provision of housing away from flood-prone areas, Disaster Risk Management public education and training, and plans for early warning systems such as evacuation plans for floods, drought and severe storms. Research Objective 2 was achieved by answering research question 3 and 4, namely to understand the state of Disaster Risk Management risks, including the mitigation measures and programmes used in the Free State Province.

Chapter 3 in its entirety provides an indication of the level of performance regarding Disaster Risk Management services by the various municipalities in the Free State Province. In addition, the level of readiness of the Free State Provincial, its four districts, nineteen municipalities and the Mangaung Metropolitan Municipality is discussed in Chapter 3.5.9 to 3.18. Funding for these events comes from municipalities' own revenue, local government equitable share and conditional grants (Crosby, 2015).

Thus, Chapter 1 refers to the general lack of capacity such as finances, Disaster Risk Management technical skills and equipment to manage disaster in South Africa effectively. The large number of disasters has resulted in many deaths and related costs. The estimated cost for the period 1980 to 2010 was more than 62 deaths, more than 18 million people affected at a cost of more than a billion rands.

In the Merriespruit disaster (Free State Province) of February 1994, the estimated cost was R45 million. In the 2015/16 drought that affected the Free State Province, an amount in excess of R108 million were used for drought-related prevention and mitigation measures. This cost did not include the psychological impact on communities such as farmers that lost their livelihoods, loss of animal stock, grazing an animal feed, amongst others. From the above discussion, it could be deduced that the socio-economic cost for disaster-related events has increased substantially. Large amounts of money, infrastructure and human lives have been lost. This could have been saved if better planning, training and education were prioritised.

The Free State Province has experienced an increase in weather-related disasters such as drought, veld fires, severe windstorms, xenophobia, flash floods and service-delivery protests. Funding for these events comes from the municipalities' own revenue, local government equitable share and conditional grants. These events have a huge influence on infrastructure and poverty alleviation programmes because they compete for the same scarce resources.

Chapter 3, under Mitigation Measures, provides a detailed analysis of the various steps taken by the Free State Provincial Disaster Management Centre to mitigate disasters and major events. For example, an amount of R15 790 824.00 was secured by the Free State Department of Agriculture for the impact of the droughts of 2016. Moreover, Table 3.10 indicates that an exorbitant R278 130 970.00 was spent on disaster-related services in South Africa for the 2014/15 year, of which R108 million was spent on the Free State Province alone. Therefore, it could be argued that South Africa spent over 38% of the entire Disaster Risk Management funding during the 2015/16 period in the Free State Province alone. This excessive amount could be utilised better for preventative measures, which would have cost much less.

This objective sought to determine the socio-economic cost relating to disaster risks in the Free State, which was achieved by conducting an in-depth analysis of literature such as Government reports, the National and Free State Disaster Management Centre Annual Report (2015/16), including the empirical study. This exercise also assisted in answering research questions 4 and 6 for a better understanding of the state of Disaster Risk Management services in the Free State Province as well as to get a sense of the financial implications of disasters in the province.

7.5.3 Research Objective 3 (RO3)

This research objective was answered in Chapter 6 in the summary of the biographical information. The findings show that 62% of the officials were indigenous Africans whose prime language of communication is English (76%). Another 55% of the respondents were between the ages 40 and 49; 21% were between 50 and 59, while 3% fell in the 60^{+} age group. In addition, 7% had more than 16 years' experience; 3% had between 11 and 15 years' experience; and 41% had between 6-10 years' experience.

From this discussion, one may conclude that the majority of officials have been employed in the Disaster Risk Management (DRM) environment for a reasonable period. With this amount of exposure as indicated above, DRM services are still not adequate. For this reason, one may argue that the proposed integrated DRM model (presented in Chapter 4 of this study), may be used as a training instrument for DRM officials to understand the key Disaster Risk Management concepts better. The proposed integrated DRM model may also be used in the strategic planning session to assign specific roles and responsibilities to all DRM officials.

Another concern is that 58% had a certificate in Disaster Risk Management and 48% had a diploma or higher qualification, which is a legislative requirement. From this, it could be deduced that most officials had the relevant level of qualification, which is level 6 or higher on the South African NQF. However, this study did not establish whether the qualification was Disaster Risk Management related or not. Therefore, one may argue that most Disaster Risk Management officials may not be appropriately qualified.

7.5.4 Research Objective 4 (RO4)

In achieving this objective, the research question explored the possible elements that may be included in the proposed integrated Disaster Risk Management model for the Free State Municipalities.

In Chapter 1, under The Pressure and Release model (PAR), Kelman (2007:1-5) explains that pressure is constantly applied by the main elements on one another and, if not addressed adequately, it will lead to large-scale human and economic losses. To alleviate this situation, this study conducted an extensive literature review and an empirical study to establish which critical elements are necessary for developing the proposed integrated Disaster Risk Management model for this study. After an extensive literature review and empirical study, it was established that Operations Management, Hazard Analysis and Risk Management, presented in Chapter 2 and Chapter 4.13.1, 4.13.2 and 4.13.3 of this study, are the key elements to be used to develop the proposed integrated DRM model for use in the Free State Province.

7.5.5 Research Objective 5 (RO5)

The comparative analysis could have been done differently, for example, that specific factors could have been compared. For example, the similarities and/or the difference in funding, human resources and equipment amongst the three municipalities should have been compared. Furthermore, it should have been established to what extent the Disaster Risk Management services differ in relation to the resources each municipality is allocated.

However, the NDMF (2005) refers to the minimum requirements for the effective functioning of Disaster Risk Management Centres. For this reason, an in-depth study of the Free State Municipalities was conducted to establish to what extent the Free State Disaster Risk Management Centres were adequately resourced in terms of the legislative requirements.

In the South African context, NDMF (2005) forms the basis on which Disaster Risk Management plans must be developed. However, five of the nine provinces in South Africa have not submitted their Disaster Risk Management Frameworks and 44 of the

municipalities have not submitted DRM frameworks of acceptable levels (IFRC & Red Crescent Societies, 2011:49). This is due mainly to lack of funding, under/undeveloped infrastructure, lack of human resource capacity, and ignorance of DRM functioning on the part of senior officials. It could be argued that because half of the provinces did not submit their DMF timeously in the year 2011, they must have been experiencing serious challenges. In the year 2017, many municipalities in the Free State Province were not adequately equipped to render effective Disaster Risk Management services. These finding are clearly discussed in Chapter 3, Section 3.5.9 of this study (Deidrick's and Van Riet, 2011).

Furthermore, in the CoCT, prior arrangements have been made for sectoral departments to use their expertise and develop individualised Disaster Risk Management Plans. In the event of a disaster or major event, the CoCT Disaster Risk Management Centre takes the lead in the coordination of disaster events. This arrangement has been working well for the CoCT and for which it has been awarded "Role-model" status for its extensive and elaborate workable Disaster Risk Management services by the United Nations (UN).

The Ekurhuleni Disaster Risk Management Centre has adopted a Community-Based Disaster Risk Reduction (CBDRR) approach in developing their plans. Disaster Risk Management consultation with the communities followed a two-pronged process; firstly, the communities were required to respond externally to the survey and then to make their contribution on the website. Secondly, the internal stakeholders were also required to feed into the responses of the communities. In this way, the Ekurhuleni Disaster Risk Management plan went through a rigorous consultative process for which it is regarded as one of the most accepted municipal plans in South Africa.

The Mangaung Metropolitan Municipality recently established its Disaster Risk Management Centre that is still to be opened officially. Its Disaster Risk Management Plan is also an extensive plan, which is comparable to that of the Ekurhuleni as well as the CoCT. In addition, an internal Disaster Risk Management committee has been formed to promote interdepartmental relations. Accordingly, the municipal departmental plans have been integrated to form the composite metropolitan municipal Plan. The sectoral plans have also been aligned with the provincial and metropolitan Disaster Risk Management Policy Framework of 2015.

However, a detailed response to this secondary research objective (RO5) is discussed in Chapter 3 of this study. Furthermore, a detailed expose of the state of the Mangaung Metropolitan Municipality, four district and the nineteen local municipalities of the Free State Province has also been discussed in Chapter 3 of this study.

7.5.6 Research Objective 6 (RO6)

The aim of the study is to contribute positively to the improvement of Disaster Risk Management within municipalities in the Free State Province by developing an integrated Disaster Risk Management model that could assist municipalities in the Free State Province to plan, implement and manage disasters risks effectively.

For this reason, the recommendations for the development of the proposed integrated DRM model was supported with substantial evidence by the literature study discussed in Chapter 2, 3, 4 and 6 of this study. Chapter 6, Figure 6.5 depicts that the majority of the Disaster Risk Management Centre respondents: 66% Provincial, 64% Metropolitan and 67% District Municipalities within the Free State Province agreed that a DRM model would assist officials to understand DRM better. Only 34% of the provincial respondents, 36% of the metropolitan respondents and 33% of the district respondents did not believe that a model would assist.

From the above findings, one may argue that it is possible that these respondents were not familiar with the benefits of the proposed Disaster Risk Management model. They were also unaware of how the proposed integrated DRM model could assist them to understand DRM services within their respective DRM centres better. For this reason, this study proposes the development of an integrated Disaster Risk Management model for the municipalities in the Free State Province.

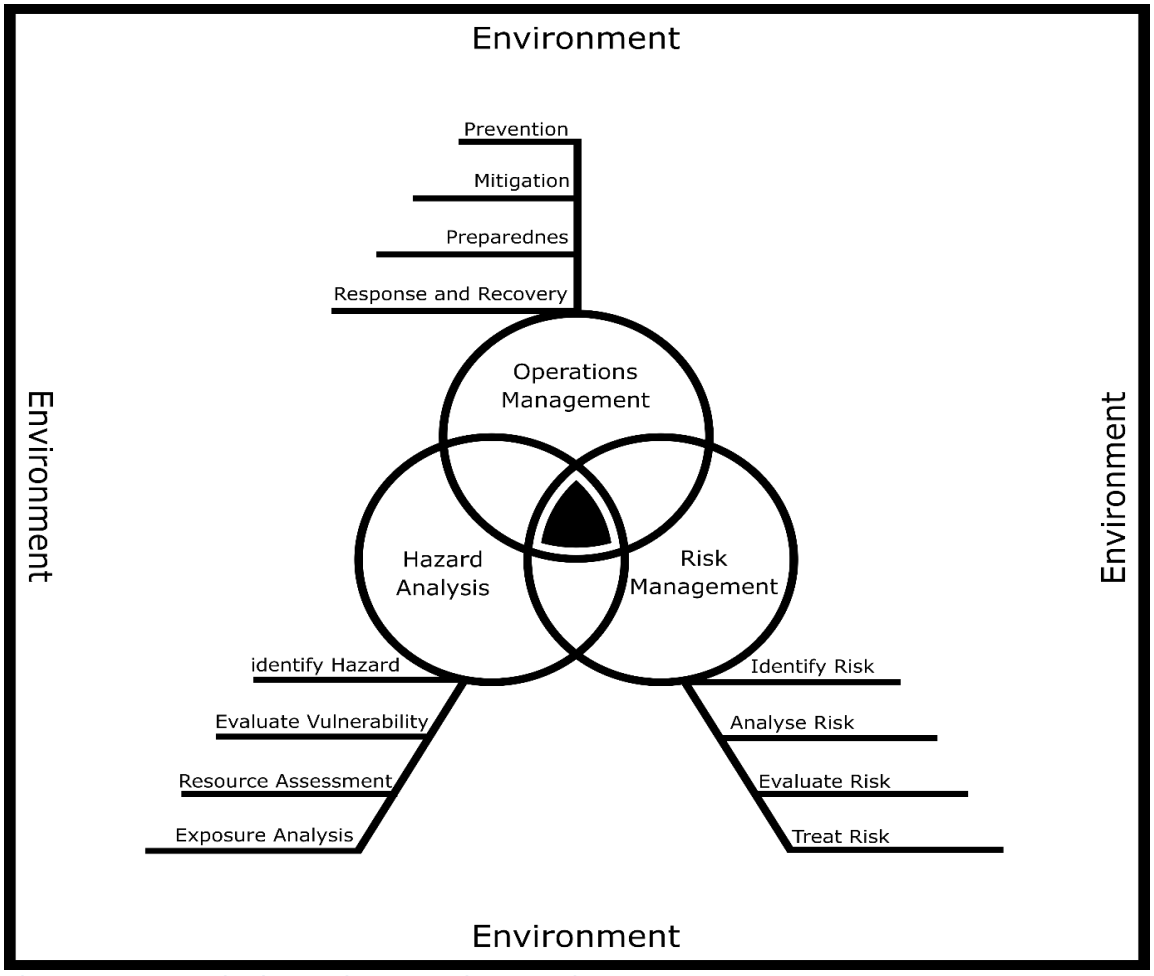
The proposed integrated Disaster Risk Management model for this study is discussed in detail in Chapter 4 of this study. Some of the pertinent issues as well as the three critical elements: Operations Management, Hazard Analysis and Risk Management are presented in Chapter 4 of this study. The three main elements interact with one another to show that Disaster Risk Management is multidisciplinary and multidimensional. The proposed integrated DRM model also shows how the three

elements of DRM interact with the environment influencing climate change, which is the main cause of weather related disasters.

The proposed integrated Disaster Risk Management model that this study developed is presented in the next section, section 7.6 of this study.

7.6 THE PROPOSED INTEGRATED DISASTER RISK MANAGEMENT MODEL

Figure 7.2: The proposed Disaster Risk Management model depicting the three core elements, namely Operations Management, Hazard Analysis and Risk Management



(Source: Researcher's own interpretation, 2018)

These key elements of the proposed integrated Disaster Risk Management model indicating the three core elements, Operations Management, Hazard Analysis and Risk Management, are shown in Figure 7.2. The three main elements as well as the secondary elements are discussed in section 7.7.1 of this chapter.

However, the proposed integrated Disaster Risk Management model was developed after studying more than 30 international and 10 local models. The study included a vast number of structures, institutions, legislation and some notable international guiding policy frameworks, which were discussed in Chapter 4 of this study. The proposed integrated Disaster Risk Management model is a visual representation of Disaster Risk Management, a cyclic process that starts with a strategic plan and ends with monitoring and evaluation.

For the purpose of this study, a very “user-friendly”, integrated Disaster Risk Management model is proposed for use by all disaster management officials within the Free State Municipalities, presented as Figure 7.2 above.

7.7 THE APPLICATION OF A PROPOSED DISASTER RISK MANAGEMENT MODEL

The successful application of a proposed Disaster Risk Management model is based on the assumption that it will yield the desired result, namely effective DRM services. It will also assist decision-makers to make appropriate decisions so that the impact on human lives and much-needed infrastructure is minimised.

Quarantelli (1998:4) argues that in order to make the appropriate decisions good preparedness planning must be in place. Quarantelli (1998:4) further argues that good preparedness planning involves a continuous planning process, rather than a focus on a finished product such as a written plan. For this reason, the elements Operations Management, Hazard Analysis and Risk Management of the proposed Disaster Risk Management model of this study should be seen as a continuous process, rather than a specific time-phased activity (Quarantelli, 1998:4).

The proposed Disaster Risk Management Model of this study allows for such a continuous planning process, which starts with the strategic planning and ends with the monitoring and evaluation, which is advocated by the Manitoba Emergency Management model.

The first element of the proposed Disaster Risk Management Model, which is Operations Management, should be discussed at the strategic planning session. The

roles and responsibilities of each official regarding Prevention, Mitigation, Preparedness and Response are discussed and agreed upon. The second element of the proposed DRM model is Hazard Analysis. For this, the responsible Disaster Risk Management functionaries are required to Identify Hazards, and Conduct Vulnerability and Risk Analysis.

The third element of the proposed Disaster Risk Management Model is Risk Management. At the strategic planning session, the identified officials who have been assigned this responsibility must first identify the risk, then analyse the risk, evaluate the risk and finally treat the risk.

The next section discusses in detail the three key elements and their respective secondary elements as shown in Figure 7.2 above.

7.7.1 Operations Management

Operations management refers to all measures undertaken to achieve operational goals such as the planning, organising, monitoring and evaluation of activities to achieve operational goals successfully. The specific requirements for effective disaster risk operations management are Preparedness, Prevention, Mitigation, Response and Recovery (Van Niekerk, 2005:17).

Operations Management in Disaster Risk Management involves the management of various activities referred to above. Furthermore, the management of human, financial, information and equipment resources must be performed as managing projects if these activities are to be managed effectively.

7.7.1.1 Preparedness

Disaster preparedness refers to all the planning activities undertaken to respond appropriately to manage the negative impacts of a disaster. Thus, preparedness includes evaluating the risk, adopting standards and regulations for quality assurance purposes, especially in infrastructure development. This also ensures that all resources are readily available and brought together to organise communication programmes (Sendai Report, 2015:56).

7.7.1.2 Prevention

Prevention refers to all activities taken to avoid or minimise the negative impacts of natural, technological and biological disasters (NDMF 2005:233). Van Niekerk *et al.* (2002:41) and Tau *et al.* (2006:19) agree that prevention refers to some specific activities such as mitigation, preparedness, response and recovery initiated to prevent or minimise the impact of disasters (NDMF, 2005:233).

7.7.1.3 Mitigation

Mitigation refers to the permanent elimination or the reduction of disaster risks by removing or limiting the threats of physical, social and/or economic threats. Since natural hazards are certain and unavoidable, it is important for the Free State Provincial governments to plan and prepare for threats that may affect its communities. Many international initiatives such as the millennium development goals, the Hyogo Framework for Action, Sustainable Development Goals, International Climate Change Negotiations and the recent Sendai Report 2015 provide broad guidelines for municipalities to develop mitigation measures. Some examples of disaster risk-mitigation measures are the provision of housing away from flood prone areas, public education and awareness campaigns and early warning systems.

7.7.1.4 Response

Disaster Risk Management response refers to the development of plans and programmes to intervene when a disaster occurs. It is a set of measures taken to assess the needs, reduce suffering, limit the spread of danger, and to commence rehabilitation as soon as possible after the occurrence of a disaster. Some response activities may include an effective public warning system, emergency operations procedure, search and rescue plans, securing food, water and medical services and maintaining law and order to bring about the normal functioning of the affected communities.

7.7.1.5 Recovery

Resulting from a disaster, a community may suffer social, economic and environmental losses, which may include financial, infrastructural as well as human

lives. The restoration of these losses is referred to as recovery. The Free State Province has lost large amounts of money in restoration efforts, which could have been utilised better in ensuring that effective mitigation measures are in place.

The second important element of the proposed integrated Disaster Risk Management model is Hazard Analysis.

7.7.2 Hazard Analysis

Hazard Analysis involves Hazard Identification, Vulnerability Analysis and Risk Analysis.

7.7.2.1 Hazards identification

The first step in the hazard identification process is to identify and classify hazards into community, economic and natural assets. These hazards are then analysed and mitigation programmes developed to prepare communities to mitigate against disasters.

7.7.2.2 Vulnerability analysis

Vulnerability is the degree of exposure of human population, critical facilities and/or the environment to the hazard. The analysis must include the frequency, duration, speed, geographical location, and magnitude of the hazard. Furthermore, it is important for local response teams (vulnerable response teams), which is made up of people in hospitals, schools, prisons, day-care centres, environmental activists and other community-based organisations to conduct vulnerability assessments (Pine, 2015:10).

7.7.2.3 Risk analysis

Risk Analysis is conduced to understand the consequences of the impact of the hazards on vulnerabilities, which are people and infrastructure, better. This involves the analysing the (probability) likelihood and severity should the disaster occur. Risk Analysis involves the estimation of the injury to people, damage to the environment, the economy, critical infrastructure and people.

The third critical element of the proposed integrated Disaster Risk Management model is Risk Management.

7.7.3 Risk Management

Risk Management involves four steps, namely to: Identify the Specific Disaster Risk, Analyse the Disaster Risk, Evaluate the Risk and Monitor Disaster Risk Reduction initiatives.

7.7.3.1 Identify the specific Disaster Risk

Disaster Risk Management officials must identify and describe the frequency, speed of onset, the areas affected, and the duration and magnitude of the hazard. Most importantly, the vulnerability of people (social capital), critical infrastructure (economic capital) and environment (environmental capital) must be considered. This will help to calculate the likely costs, identify the capacity, gaps, inconsistencies, and efficiencies that are available to reduce the losses (NDMF, 2005:59-62). These are important factors, which may assist in the planning and preparing for an impending disaster (Tau, 2006:19).

7.7.3.2 Analyse the Disaster Risk

When analysing the disaster risk, first establish whether the risk is a priority or not and then the severity of the expected impact (NDMF 2005:62). Pine (2015:132) suggests that to establish whether a risk is a priority or not, the likelihood and consequences of the hazard, the voluntary or involuntary nature of the risk, the cost benefit ratios of mitigating the risks and the political and social ramifications of certain mitigation decisions must be considered. Once this analysis has been concluded, it may become easier to evaluate the risks and to decide on an action plan for the treatment (mitigation) of the risk (Pine, 2015; Smith, 2004).

7.7.3.3 Risk evaluation

Risk evaluation is a highly specialised, multidisciplinary, integrated and comprehensive process that requires reprioritisation of the identified disaster risks to establish whether there are any competing threats assessed at the same level. Since

all the threats cannot be addressed at the same time, scientific expertise, indigenous knowledge, finances and equipment, which are scarce resources must be used effectively (NDMF, 2005; Reddy, 2010).

7.7.3.4 Monitor Disaster Risk Reduction initiatives

This stage involves the monitoring and evaluation of disaster risk reduction programmes to ensure whether the planned programmes are effective. What is more is that information collected up to this stage may be disseminated to the relevant stakeholders, which in turn may assist in the development of plans and programmes (NDMF, 2005:63).

7.7.4 Environment

The proposed integrated Disaster Risk Management model will have to operate within either an internal or an external environment, which may influence the effective functioning of the proposed integrated Disaster Risk Management model. For example, changes in the environment (Global Warming) will also have an influence on the circles (elements) and thus on DRM as a service delivery imperative. For this reason, the probable impact of the environmental factors on the proposed DRM model must be factored into the strategic planning sessions to ensure the optimal functioning of the proposed DRM model.

7.7.5 Monitoring and evaluation

All three elements, Operations Management, Hazard Analysis and Risk Management, function in a specific context and changes to any one of them will have either a negative or a positive influence on the effective functioning of the proposed integrated DRM model. The core elements of the proposed DRM model are represented by circles of equal dimension, because all three elements are of equal importance for acceptable DRM services. Therefore, all elements must function optimally and in unison for the proposed DRM model to be effective. For this reason, monitoring and evaluation is another important aspect that must be considered in the application of the proposed integrated DRM model. The absence of an effective monitoring and

evaluation system may have severe consequences on a specific community and/or its economy in the event of a disaster.

The aim of the study was to contribute positively to the improvement of Disaster Risk Management within municipalities in the Free State Province by developing an integrated Disaster Risk Management model, which would assist municipalities in the Free State Province, to plan, implement and manage disasters risks effectively. Thus, the proposed integrated Disaster Risk Management model will assist Disaster Risk Management officials of the Free State Provincial, Metropolitan and District Disaster Risk Management Centres to plan, implement and manage disasters risks effectively.

In addition, the proposed integrated DRM model may be used by DRM officials as well as DRMAF in the Free State Province to design a generic monitoring and evaluation tool. Furthermore, this model, if used appropriately, will go a long way towards supporting a common understanding of the important tenets of DRM. In achieving this objective, Operations Management, Hazard Analysis and Risk Management were considered as core elements for effectiveness of the proposed integrated DRM model.

7.8 RECOMMENDATIONS OF THE STUDY

The aim of the study was to contribute positively to the improvement of Disaster Risk Management within municipalities in the Free State Province by developing an integrated Disaster Risk Management model that could assist municipalities in the Free State Province to plan, implement and manage disasters risks effectively.

This study found that there is a lack of adequate funding, staffing and equipment to render effective Disaster Risk Management services in the Free State Province. There is also a strong correlation amongst Disaster Risk Management officials of the various Free State municipalities not having a common understanding of some key concepts of Disaster Risk Management, resulting in a blurring of roles, responsibilities and accountability. Thus, the proposed integrated Disaster Risk Management model recommended by this study could contribute positively to the improvement of Disaster Risk Management services within municipalities of the Free State Province to plan, implement and manage disasters risks effectively.

However, based on the above discussion and findings, the study makes the following recommendations:

- That the South African National Department of Environmental Affairs investigate the possibility of advancing climate change adaptation as a disaster risk-reduction strategy.
- The National Disaster Management Centre should investigate the systematic development and application of strategies, legislation, policies and practices by municipalities in South Africa to make a positive contribution to effective Disaster Risk Management services in South Africa.
- The National Disaster Management Centre should explore the relationship between Disaster Risk Reduction, sustainable development and poverty alleviation.
- The Free State Provincial Disaster Management Advisory Forum should explore the extent to which Disaster Risk Management Centres and educational institutions such as universities play a greater role by working together to empower schools in creating greater Disaster Risk Management awareness.
- The Free State Cooperative Governance and Traditional Affairs (CoGTA) in conjunction with institutions of higher learning and education must investigate the role of government in introducing systems of incentives to South African private-sector institutions to support/promote efficient and effective functioning of Municipal Disaster Risk Management Centres within their jurisdiction.

The study also found that most of the communities that live in informal settlements are poor and vulnerable. Their vulnerability is aggravated by the lack of adequate water and sanitation, diseases such as HIV/AIDS and unemployment. In the wider South African context, the lack of a political voice and issues of cross-border conflict due to unstable governments are also a major cause for concern. Some of the other vulnerabilities are ageing infrastructures such as dams and reservoirs, roads, rail and bridges, which also adds pressure to an ailing economy. Based on these findings, this study further recommends a community-based disaster risk-reduction strategy headed by community-based social structures. Thus, schools, churches and other community-based structures should be integral components of community-based disaster-risk reduction strategies.

Another important finding is that officials who are trained may be good in managing disaster risks. Yet, good Disaster Risk Management may not always be effective as opposed to good disaster preparedness planning. For example, a disaster, which is bound to affect an international airport such as OR Tambo International Airport communications system, requires informed, appropriate decisions to be taken. For this, good disaster preparedness planning with the best strategy is essential to minimise the impact on the economy. Therefore, the role of good preparedness planning is very important for effective Disaster Risk Management services.

7.9 JUSTIFICATION OF THE STUDY

Disaster Risk Management (DRM) is a multisectoral, multidimensional and complicated management activity (DMA, 2002). It spans all departments and entities that have to make specific contributions in reducing disaster risks. Hence, every stakeholder, department and/or entity must have the capacity to ensure that DRM is carried out successfully. However, the seemingly complicated nature of complying with the requirements of the DMA (2002), NDMF (2005) and the numerous other legislative frameworks makes it a ‘daunting’ task.

For this reason, this study developed and proposed an integrated Disaster Risk Management model with three key elements: Operations Management, Hazard Analysis and Risk Management. The effective use of the proposed integrated Disaster Risk Management Model will ensure that there is a common understanding of the main elements of Disaster Risk Management.

Operations Management refers to the overall management of disaster risks requiring generic management principles. Secondly, Hazard Analysis deals with identifying and analysing hazards prevalent in the municipality concerned, while thirdly, Risk Management deals with the management of the identified risks and requires project management tools and techniques.

The proposed integrated Disaster Risk Management Model makes the understanding of Disaster Risk Management a much more understandable and implementable service delivery imperative. The many sectors, departments, entities and the public

are not Disaster Risk Management specialists and therefore this proposed integrated DRM model makes an understanding of DRM much easier.

In this regard, firstly, a hazard analysis has to be conducted. This means that there must be consensus by all stakeholders of the prevalence of the most common hazards in the community. Secondly, there must be an understanding of the risks these hazards pose to the community, the environment and/or the economy; thereafter the risks that are posed must be treated. Finally, both Hazard Analysis and Risk Assessment must be managed through effective Operations Management.

If, for example, a municipality experiences urban flooding or a multiple rail or road accident, obviously the officials from the Public Works Department or the Emergency Management Services have the relevant expertise and the knowhow of the standard operating procedures (SOP). Thus, the capacity to manage urban floods or mudslides by a relevant department other than the Disaster Risk Management officials must not be discounted. For this reason, the Emergency Management Services and/or the Department of Public Works, Roads and Transport are best suited to build capacity to manage motor vehicle accidents. They have the necessary skills and knowledge regarding standard operating procedure to build capacity within the community.

Since the communities are the first respondents to a disaster, they should be capacitated to manage this event in a particular way before the arrival of the relevant experts. In this way, the main principles of DRM, which is disaster Risk Reduction, will be emphasised.

Therefore, for the purpose of this study a user-friendly, integrated DRM model is proposed for all disaster management officials of the Free State municipalities to understand DRM concept as a whole better.

Thus, the basic minimum requirements by all stakeholders for effective DRM services are to understand the undermentioned three processes.

- Hazard Analysis
- Risk Assessment
- Operations Management

However, it is the responsibility of the Disaster Risk Management officials to ensure that all stakeholders are aware of their roles and responsibilities in the effective management of disasters. The proposed integrated Disaster Risk Management model defines specific roles and responsibilities for all DRM functionaries, which is a major contribution of this study.

Furthermore, the officials involved with DRM must ensure that the proposed integrated DRM model is understood by all concerned. Thus, another important contribution of this proposed Disaster Risk Management Model is that it provides a unified framework for a common understanding of the basic tenets of Disaster Risk Management.

In addition, this study contributes to the general body of knowledge in Disaster Risk Management since it envisages assisting Disaster Risk Management officials in the Free State Municipalities to plan, implement and manage disaster risks effectively.

7.10 SIGNIFICANCE OF THE STUDY

In this regard, the first significant contribution of this study is that it proposes an integrated DRM model, which may be used to improve the Disaster Risk Management services in the Free State Province.

The second major contribution of this study is that the proposed integrated Disaster Risk Management model clarifies roles and responsibilities of functionaries in Disaster Risk Management work environment. This means that they may be involved in Operations Management, Hazard Analysis or Risk Management.

The international view of integrated Disaster Risk Management Models focuses on clarifying concepts for a clearer common understanding, whilst the South African perspective of integrated Disaster Risk Management Models focuses on the management of disaster risks. This proposed integrated Disaster Risk Management model integrates both perspectives to provide a common understanding of the concepts as well as it defines roles and responsibilities of Disaster Risk Management officials for effective delivery of DRM services. Whilst most integrated Disaster Risk Management Models include these two perspectives and may be regarded as two-dimensional, this proposed integrated Disaster Risk Management Model includes the

hazard identification component as the third dimension. This is the third important contribution of this study.

Finally, the proposed integrated Disaster Risk Management Model makes a significant contribution to the existing body of knowledge on models in DRM. It is designed for a specific context and for a specific environment, and when these circumstances change, the model will have to be modified as well to accommodate the changes.

7.11 LIMITATION OF THE STUDY

The study was subjected to various (external) factors, such as the assurance and readiness of the respondents to take part in the study. Inasmuch as appointments were secured for some of the interviews with Disaster Risk Management practitioners, some were unexpectedly called by their principals to carry out other duties.

There ought to be at least six disaster Management Centres in the Free State Province. These are the Provincial Disaster Risk Management Centre (PDMC), the Metropolitan Disaster Risk Management Centre MDMC) and four district municipalities, namely Fezile Dabi, Thabo Mofutsanyana, Lejweleputswa and Xhariep. All these municipalities have their own challenges such as staffing, funding and unique disaster risks and therefore function at different levels. Some centres have adequate staff who are not adequately qualified, whilst others are understaffed and underfunded. For these reasons, the various municipalities function at different levels to offer adequate Disaster Risk Management Services. The different provinces in South Africa also face financial and human resource challenges. All these factors have influenced this study in one way or another, which was beyond the control of the researcher.

7.12 CONCLUSION

The aim of the study was to contribute positively to the improvement of Disaster Risk Management Services within the municipalities of the Free State Province by developing an integrated DRM model that would assist municipalities in the Free State Province to plan, implement and manage disasters risks effectively.

To achieve the aim of this study, an extensive analysis of literature on Disaster Risk Management and Disaster Risk Management models was conducted. The literature

review was validated by the empirical study, which culminated in the development of a proposed integrated Disaster Risk Management model, based on the functioning of the Cunny Comprehensive and the Manitoba models.

In its search for information to develop the proposed integrated Disaster Risk Management model, this study found three critical elements, namely Operations Management, Hazard Analysis and Risk Management, which form the foundation for effective Disaster Risk Management Services. Therefore, the proposed disaster Risk Management model for this study presented in Figure 7.2 includes the three key elements, namely Operations Management, Hazard Analysis and Risk Management. In addition, the model includes the environment, monitoring and evaluation. The reason for this is that as the environment changes, the model too must be adapted and monitoring and evaluation have been included to establish the effectiveness of the model.

A graphic representation of the proposed integrated DRM model is presented in Chapter 7.5 (Figure 7.2), which highlights the need for a common understanding of the important concepts of DRM. Based on the three dimensions of the proposed integrated Disaster Risk Management model, specific roles and responsibilities are assigned to Disaster Risk Management officials at the strategic planning session.

This chapter also provides a summary of the research process, the aims and objectives of the study and how they were achieved. The delimitations indicate some of the constraining factors whilst the recommendations present a possible avenue for further research.

The aim of the study was achieved by developing a proposed integrated DRM model for the Free State Municipalities. This proposed integrated DRM model will contribute positively to the improvement of DRM services within municipalities in the Free State Province. In addition, a proposed integrated DRM model makes a significantly positive contribution to the general body of knowledge in Disaster Risk Management arena.

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APPENDICES

Refer to next page for Appendix A: Consent Form

Appendix A

MANGAUNG
METRO MUNICIPALITY
METRO MUNISIPALITEIT
LEKGOTLA LA MOTSE
DIRECTORATE
OFFICE OF THE
CITY MANAGER

Enquiry. Adv. C Naidoo Your Ret

Email: Charlie.Naidoo@mangaung.co.za Date: 24 January 2017

Mr L Munsamy
Lecturer: Government Management
CUT: Free State
Dear Sir

CONSENT TO CONDUCT A DISASTER RISK MANAGEMENT MODEL FRAMEWORK

Your letter dated 7 December 20 6 refers.

Kindly take note that the City Manager has approved your request.

Please contact the General Manager: Disaster Management, Mr. Billy Barnes on 084 759 9547 or 051 406 6353.

Yours fait faithfully

ADV. CH ADV. CHARLIE NAIDOO
GENERAL MANAGER: LEGAL SERVICES

PO Box 3704, Bloemfontein, 9300 Room 201, Bram Fischer Building, 5 De Villiers Road, Bloemfontein Tel: +27 51 405 8621 Fax: +27 51 405 8119 E-Mail: Tankiso.Mea@mangaung.co.za Website: www.mangaung.co.za

MANGAUNG

METROPOLITAN

Office of the City Manager

09 -12- 2016

Mangaung Metropolitan Municipality

DIRECTORATE OFFICE OF THE CITY MANAGER

Municipality/
MUNISIPALITEIT LEK
GOT LA MOTS E

Legal Services

Memo

Our Ref:	Adv. Charlie Naidoo	Your Ref:	
Phone:	(051) 405 8692	Fax:	(051) 405 8119
Email:	Charlie.Naidoo@mangaung.co.za	Date:	8fr December 2016

Adv. Tankiso Mea
Acting City Manager

REQUEST FOR CONSENT TO CONDUCT A DISASTER RISK MANAGEMENT MODEL FRAMEWORK

A written request was received from a lecturer from Central University of Technology to conduct research with a view of formulating a Disaster Risk Management Model, the letter of which is attached hereto for your attention.

The applicant has indicated that the model, which he intends developing will be made available to the municipality without any compensation to the applicant.

The matter has been discussed with the GM: Disaster Management who is in favour of such a research as the information acquired could be used to improve disaster management services.

Kindly peruse the attached application and grant approval in the event that you are in agreement with the submission.

Kind regards

.....

ADV: CHARLIE NADOO
GENERAL MANAGER: LEGAL SERVICES

Approved

APPENDIX B: INTERVIEW SCHEDULE

Disaster Risk Management Survey : Interview Schedule

Data Collection for the purpose of developing an Integrated Disaster Risk Management Model for the Municipalités in the Free State.

1. Purpose

The purpose of the Schedule is to examine the effectiveness of Disaster Risk Management (DRM) in your municipality/institution, and its implications for effective Disaster Risk Management Services. In this regard, the researcher would be able to identify the gaps and challenges of the sample selected, and come up with viable alternatives. It will also assist the researcher to develop an Integrated Disaster Risk Management Model, which will promote sustainable infrastructure development, thereby reducing poverty levels.

In this regard, you are kindly requested to reflect on the current disaster-risk management practices at your municipality/institution and respond as accurately as possible. Your participation is voluntary; data collection will comply with the highest ethical consideration and all information will remain confidential.

Thank you in anticipation.

2. BIOGRAPHICAL INFORMATION

2.1 Population Group

1	African	2	Asian	3	Coloure	4	White

2.2 Language most commonly used

1	Afrikaans	2	English	3	Sesotho	4	Setswana
5	IsiXhos	6	IsiZulu	7	Other		

2.3 Age Group

1	18 - 29	2	30 - 39	3	40 - 49	4	50 - 59
5	60+						

2.4 Highest level of education completed (indicate only one of the following)

1	Certificate	2	Diploma
3	Degree	4	Honours or
5	Masters/MBA	6	PhD/DTech

2.5 Are you employed in Disaster Risk Management at an operational level?

1	Yes	2	No

2.6 Are you employed in Disaster Risk Management at a strategic level?

1	Yes	2	No

2.7. Are you a member of the Join Operation Centre?

1	Yes	2	No

2.8 Total no of years' experience in the Disaster Risk Management field?

1	1-5 Years	2	6-10Years	3	11-15 Years
4	16+				

3. Please Mark with an "X" the municipality which best represents your involvement in Disaster Risk Management. Please mark only ONE municipality.

No	Type of Municipality:	Name of Municipality	Place your "X" in this column
3.1	**Metropolitan**	**Mangaung Metropolitan**	
3.2	**District Municipality:**	**Xhariep District**	
3.2.1	Local Municipality	Naledi	
3.2.2	Local Municipality	Mohokare Local Municipality	
3.2.3	Local Municipality	Kopanong Local Municipality	
3.2.4	Local Municipality	Letsemeng Local Municipality	
3.3	**District Municipality**	**Lejweleputswa District**	
3.3.1	Local Municipality	Tokologo	
3.3.2	Local Municipality	Tswelopele	
3.3.3	Local Municipality	Nala	
3.3.4	Local Municipality	Masilonyana	
3.3.5	Local Municipality	Matjhabeng	
3.4	**District Municipality**	**Fezile Dabi**	
3.4.1	Local Municipality	Moqhaka	
3.4.2	Local Municipality	Ngwathe	
3.4.3	Local Municipality	Metsimaholo	
3.4.4	Local Municipality	Mafube	
3.5	**District Municipality**	**Thabo Mofutsanyana**	
3.5.1	Local Municipality	Phumelela	
3.5.2	Local Municipality	Maluti-a-Phofung	
2.5.3	Local Municipality	Nketoana	
3.5.4	Local Municipality	Dihlabeng	
3.5.5	Local Municipality	Setsoto	
3.5.6	Local Municipality	Mantsopa	

4. If you have answered question 3, please ignore this section and go to question 5.

Please mark with an "X" the organisation which best represents your involvement in Disaster Risk Management. Please mark only ONE organisation.

No	Type of Organisation	Place your "X" in this column
4.1	Free State Provincial Disaster Management Advisory Forum	
4.2	Free State Provincial Disaster Management Centre	
4.3	Mangaung Metropolitan Disaster Management Centre	
4.4	Municipal Disaster Risk Management Advisory Forum	
4.5	Municipal Disaster Risk Management Centre	
4.6	District Disaster Risk Management Advisory Forum	
4.7	District Disaster Risk Management Centre	
4.8	Cooperative Governance and Traditional Affairs	
4.9	Provincial Joint Operation Committee (Member)	
4.10	Bloemfontein Chamber of Commerce and Industry	
4.11	African Farmers Association of South Africa	
4.12	South African Police Service	
4.13	South African National Defence Force	
4.14	Department of Social Development	
4.15	Department of Education	
4.16	Department of Health	
4.17	Department of Rural Development and Land Affairs.	
4.18	Afriforum	
4.19	University/College Student	
4.20	Non-Governmental Organisation/Non-Profit Organisation	
4.21	Faith Based Organisation	
4.22	Community Development Worker	
4.23	Ward Councillor	
4.24	Disaster Risk Management Volunteer	
4.25	Emergency Management Services	

5.1 Describe the Disaster Risk Management services provided by your organisation.

5.2 What is your opinion of the Framework with which you are mostly involved?

5.3 What would you do differently to improve DRM services at your centre?

5.4 Which are the most important elements of Disaster Risk Management?

5.5 Explain how the Municipal Interdepartmental Disaster Management Committee (MIDMC) functions.

5.6 Your opinion of how the Provincial Interdepartmental Disaster Management Committee (PIDMC) functions.

5.7 What is your view of the Forum with which you are mostly involved?

5.8 Explain the Hazard Identification process in your institution.

5.9 Explain the Risk analysis process in your institution

5.10 Describe how the main components/sections of your DRM centre functions

5.11 Describe the challenges experienced in your institution regarding the implementation of the DRM legislation?

5.12 What challenges did you experience when developing your DRM plan? Why was this?

5.13 Would you recommend a DRM model for your municipality? Why?

5.14 How do you understand Disaster Disk Management as a function.

5.15 Which aspects/elements of Disaster Risk Management training is urgently needed in your organisation and why?

5.16 State the three most important resources that your organisation needs very urgently. Discuss what would happen if a disaster occurs and you do not have these resources.

Thank you for your time and effort

APPENDIX C: QUESTIONNAIRE FOR THE SURVEY

1. Purpose

The purpose of the questionnaire is to examine the effectiveness of Disaster Risk Management (DRM) in your municipality/institution, and its implications for effective Disaster Risk Management Services. In this regard, the researcher would be able to identify the gaps and challenges of the sample selected, and come up with viable alternatives. It will also assist the researcher to develop an Integrated Disaster Risk Management Model that will promote sustainable infrastructure development, thereby reducing poverty levels.

In this regard, you are kindly requested to reflect on the current disaster-risk management practices at your municipality/institution and complete the questionnaire as accurately as possible. Your participation is voluntary; data collection will comply with the highest ethical consideration and all information will remain confidential.

You are required to kindly follow the instructions very carefully.

1: Use a **black pen** and print neatly.
2. Mark the appropriate column with an **X**.

Thank you in anticipation.

2. BIOGRAPHICAL INFORMATION

2.1 Population Group

1	African	2	Asian	3	Coloure	4	White

2.2 Language most commonly used

1	Afrikaans	2	English	3	Sesotho	4	Setswana
5	IsiXhos	6	IsiZulu	7	Other		

2.3 Age Group

1	18 - 29	2	30 - 39	3	40 - 49	4	50 - 59
5	60+						

2.4 Highest level of education completed (indicate only one of the following)

1	Certificate	2	Diploma
3	Degree	4	Honours or
5	Masters/MBA	6	PhD/DTech

2.5 Are you employed in Disaster Risk Management at an operational level?

1	Yes	2	No

2.6 Are you employed in Disaster Risk Management at a strategic level?

1	Yes	2	No

2.7. Are you a member of the Join Operation Centre?

1	Yes	2	No

2.8 Total no of years' experience in the Disaster Risk Management field?

1	1-5 Years	2	6-10Years	3	11-15 Years
4	16+				

3. Please Mark with an "X" the municipality which best represents your involvement in Disaster Risk Management. Please mark only ONE municipality.

No	Type of Municipality:	Name of Municipality	Place your "X" in this column
3.1	**Metropolitan**	**Mangaung Metropolitan**	
3.2	**District Municipality:**	**Xhariep District**	
3.2.1	Local Municipality	Naledi	
3.2.2	Local Municipality	Mohokare Local Municipality	
3.2.3	Local Municipality	Kopanong Local Municipality	
3.2.4	Local Municipality	Letsemeng Local Municipality	
3.3	**District Municipality**	**Lejweleputswa District**	
3.3.1	Local Municipality	Tokologo	
3.3.2	Local Municipality	Tswelopele	
3.3.3	Local Municipality	Nala	
3.3.4	Local Municipality	Masilonyana	
3.3.5	Local Municipality	Matjhabeng	
3.4	**District Municipality**	**Fezile Dabi**	
3.4.1	Local Municipality	Moqhaka	
3.4.2	Local Municipality	Ngwathe	
3.4.3	Local Municipality	Metsimaholo	
3.4.4	Local Municipality	Mafube	
3.5	**District Municipality**	**Thabo Mofutsanyana**	
3.5.1	Local Municipality	Phumelela	
3.5.2	Local Municipality	Maluti-a-Phofung	
2.5.3	Local Municipality	Nketoana	
3.5.4	Local Municipality	Dihlabeng	
3.5.5	Local Municipality	Setsoto	
3.5.6	Local Municipality	Mantsopa	

4. If you have answered question 3, please ignore this section and go to question 5.

Please mark with an "X" the organisation, which best represents your involvement in Disaster Risk Management. Please mark only ONE organisation.

No	Type of Organisation	Place your "X" in this column
4.1	Free State Provincial Disaster Management Advisory Forum	
4.2	Free State Provincial Disaster Management Centre	
4.3	Mangaung Metropolitan Disaster Management Centre	
4.4	Municipal Disaster Risk Management Advisory Forum	
4.5	Municipal Disaster Risk Management Centre	
4.6	District Disaster Risk Management Advisory Forum	
4.7	District Disaster Risk Management Centre	
4.8	Cooperative Governance and Traditional Affairs	
4.9	Provincial Joint Operation Committee (Member)	
4.10	Bloemfontein Chamber of Commerce and Industry	
4.11	African Farmers Association of South Africa	
4.12	South African Police Service	
4.13	South African National Defence Force	
4.14	Department of Social Development	
4.15	Department of Education	
4.16	Department of Health	
4.17	Department of Rural Development and Land Affairs.	
4.18	Afriforum	
4.19	University/College Student	
4.20	Non-Governmental Organisation/Non-Profit Organisation	
4.21	Faith Based Organisation	
4.22	Community Development Worker	
4.23	Ward Councillor	
4.24	Disaster Risk Management Volunteer	
4.25	Emergency Management Services	

5.1 How good is the Disaster Risk Management services provided by the centre with which you are mostly involved?

Centre	Don't Know	Very Poor	Poor	Good	Very Good
Provincial Disaster Risk Management Centre (PDRMC)					
Metropolitan Disaster Risk Management Centre (MDRMC)					
District Disaster Risk Management Centre (DDRMC)					
Local Disaster Risk Management Centre (LDRMC)					

5.2 What is your opinion of the Framework with which you are mostly involved?

Framework	No Opinion	Very Poor	Poor	Good	Very Good
Provincial Disaster Risk Management Framework (PDRMF)					
Metropolitan Disaster Risk Management Framework (MDRMF)					
District Disaster Risk Management Framework (DDRMF)					
Local Disaster Risk Management Centre (LDRMC)					

5.3 Please provide a reason/s for your answer for 5.2

5.4 How would you assess the functioning of the following committees?

Committees	Don't Know	Very Poor	Poor	Good	Very Good
Provincial Interdepartmental Disaster Management Committee (PIDMC)					
Municipal Interdepartmental Disaster Management Committee (MIDMC)					

5.5 What is your assessment of the Forum with which you are mostly involved?

Forum	Don't Know	Very Poor	Poor	Good	Very Good
Provincial Disaster Risk Management Advisory Forum (PDRMAC)					
Metropolitan Disaster Risk Management Advisory Forum (MDRMAC)					
District Disaster Risk Management Framework (DDRMF)					

5.6 Currently, your municipality is adequately complying with the following legislations?

Legislation	Neutral	Strongly Disagree	Disagree	Agree	Strongly Agree
The Disaster Management Act (DMA) 57 of 2002					
National Disaster Management Framework (NDRMF) of 2005					
Local Government Municipal Systems Act (MSA) 32 of 2000					
Integrated Development Planning for Local Government (IDP)					

5.7 What challenges are being experienced in your institution regarding the implementation of the following legislation?

5.8 Which plan were you mostly involved in developing?

Plan	**Mark with an "X"**
Provincial Disaster Risk Management Plan (PDRMP)	
Metropolitan Disaster Risk Management (MDRMP)	
District Disaster Risk Management Plan (DDRMP)	
Local Disaster Risk Management Plan (LDRMP)	

5.9 At what level is the Plan you marked above functioning?

Plan	**Don't Know**	**Level 1**	**Level2**	**Level 3**
Provincial Disaster Risk Management Plan (PDRMP)				
Metropolitan Disaster Risk Management Plan (MDRMP)				
District Disaster Risk Management Plan (DDRMP))				
Local Disaster Risk Management Plan (LDRMP)				

5.10 Would you recommend a model to understand disaster risk management in your municipality better?

	No	Yes
Provide a reason for your answer in 5.7		

5.11 How many specialists are employed in your municipality for the following hazards?

Hazard Category	Number Employed
Flood Management	
Fire Management	
Drought Management	
Severe Storm Management	
Major Incident	

5.12 Do you have sufficient skilled staff to manage the following hazards?

Hazards	Don't Know	Yes	No
Flood			
Fire			
Drought			
Severe Storm			
Major Incident			

5.13 Rate the conceptualisation of Disaster Risk Management processes by the following officials in your municipality.

Officials	Don't Know	Very Low	Low	High	Very High
Politicians					
Senior managers.					
Disaster Risk Management functionaries.					
Officials from service departments					

5.14 Rate the understanding of Disaster Risk Management processes by the following institutions.

Departments in your municipality	Very Low	Low	Moderate	High	Very High
Municipal departments					
Provincial Government departments					
NGO, CBO, FBO					
Other					

5.15 What is your opinion of the following aspects of Disaster Risk Management?

Aspects of Disaster Risk Assessment	Neutral	Strongly Disagree	Disagree	Agree	Strongly Agree
Disaster Risk Assessment is a scientific process					
Disaster Risk Management must be undertaken by experts with specialised knowledge and skills					
Hazard Analysis requires professional training					
Disaster Risk Management may only be managed by					

individuals with relevant qualifications					
Disaster Risk Management is an expensive process					
Operations Management may be regarded as disaster Risk management					

5.16 What impact does the following hazards have in your municipality?

Hazard	Don't Know	Minimal	Moderate	High	Severe
Flood					
Fire					
Severe storm					
Drought					
Major Incident					

5.17 Do the following institutions have sufficient resources to manage disasters effectively?

Centres	Neutral	NO	YES
Provincial Disaster Risk Management Centre			
Metropolitan Disaster Risk Management Centre			
District Disaster Risk Management Centre			
Local Disaster Risk Management Centre			

5.18 Evaluate the community's preparedness to mitigate against the following hazards in your municipality?

Hazard	Don't Know	Not Prepared	Moderately well Prepared	Well Prepared
Flood				
Fire				
Severe Storm				
Drought				
Chemical Spillage				

5.19 How prepared is your municipality to provide Disaster Risk Management Services?

Resources	Don't Know	Not Prepared	Moderately well Prepared	Well Prepared
Human Resource Training & Development services				
Financial Management Services				
Disaster Risk Management Services				
General Management Services				
Communication Services				
Emergency Management Services				

Thank you for your time and effort